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THIRTIETH AND THIRTY-FIRST ANNUAL REPORTS

OF THE

ILLINOIS STATE BEEKEEPERS' ASSOCIATION

1930 - 1931

FORTIETH AND FORTY-FIRST YEARS OF ASSOCIATION

Organized February 26, 1891, at
Springfield, Illinois

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Compiled by
V. G. MILUM
Champaign, Illinois

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LETTER OF TRANSMITTAL.

OFFICE OF THE SECRETARY,
CHAMPAIGN, ILLINOIS, *December 31, 1931.*

To His Excellency, Louis L. Emmerson, Governor of the State of Illinois:

SIR: I have the honor to transmit herewith the Thirtieth and Thirty-first Annual Reports for the fortieth and forty-first years of the Illinois State Beekeepers' Association.

V. G. MILUM, *Secretary.*

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THIRTIETH AND THIRTY-FIRST ANNUAL REPORTS

FOR THE FORTIETH AND FORTY-FIRST YEARS

OF THE

Illinois State Beekeepers' Association

OFFICERS OF ILLINOIS STATE BEEKEEPERS' ASSOCIATION FOR 1930.

C. A. MACKELDEN - - - - - - - President
Jerseyville.

CARL H. TUDOR - - - - - - - Vice-President
DeKalb.

LOUIE VANNIS - - - - - - - Vice-President
Harrisburg.

J. N. KORITZ - - - - - - - Vice-President
Buckley.

BENJ. H. FISCHER - - - - - - Vice-President
Roanoke.

A. G. GILL - - - - - - - Vice-President
Chicago.

ELMER KOMMER - - - - - - - Treasurer
Woodhull.

V. G. MILUM - - - - - - - - Secretary
Vivarium Building, Champaign.

OFFICERS OF ILLINOIS STATE BEEKEEPERS' ASSOCIATION FOR 1931 AND 1932.

C. A. MACKELDEN - - - - - - President
Jerseyville.

LOUIE VANNIS - - - - - - Vice-President
Harrisburg.

J. N. KORITZ - - - - - - Vice-President
Buckley.

BENJ. H. FISCHER - - - - - Vice-President
Roanoke.

A. G. GILL - - - - - - Vice-President
Chicago.

S. F. PETERSON - - - - - - Vice-President
East Moline.

ELMER KOMMER - - - - - - Treasurer
Woodhull.

V. G. MILUM - - - - - - - Secretary
Vivarium Building, Champaign.

MINUTES OF THE FORTIETH ANNUAL CONVENTION OF THE ILLINOIS STATE BEEKEEPERS' ASSOCIATION, SPRINGFIELD, ILLINOIS, NOVEMBER 18-19, 1930.

The fortieth annual convention of the Illinois State Beekeepers' Association, held in the parlors of the St. Nicholas Hotel, Springfield, Illinois, was called to order at 9:30 a. m., November 18, 1930, by the President, C. A. Mackelden of Jerseyville. The minutes of the last meeting as printed in the thirty-ninth annual report were read by the secretary, and on motion approved.

The following committees were appointed by President Mackelden: Auditing—Edwin Peterson, Kewanee, and Louie Vannis, Harrisburg; Legislative—A. L. Kildow, Putnam, O. W. Kennett, Ohlman, and V. G. Milum, Champaign; Resolutions—Frank C. Pellett, Hamilton, and S. F. Peterson, East Moline; Banquet—Ed. Kommer, Cambridge, and Harry Leur, Jerseyville; Question Box—B. F. Bell, Kingston Mines, and Ben Fischer, Roanoke.

The financial reports of the secretary and treasurer were read by V. G. Milum and Elmer Kommer, respectively, and referred to the Auditing Committee, who at the final business session on the last day of the convention reported them correct and on motion of Mr. Tyler, were accepted. These reports showed a balance on hand at the last convention on December 3, 1929 of $323.50. With total receipts of $462.50 and total expenditures of $147.12 up to April 3, 1930, there was on hand a balance of $315.38 which was on deposit in the Woodhull State Bank when its doors were closed April 3, 1930. The secretary had been instructed at the previous convention to secure depository bonds but owing to the bank's failing to supply certain information and other delays, the association was notified on March 20 that the bank could not be bonded. The treasurer received instructions by mail on April 3 to withdraw the association funds from the bank but the doors of the bank had already been closed by order of the State Bank Examiner. After the closing of the Woodhull State Bank there were further total receipts to November 18, 1930 of $214.58 and total expenditures of $186.22, leaving a balance on hand of $28.36. In the above receipts is included a 20 per cent dividend amounting to $63.08 from the receiver of the Woodhull State Bank. It is expected that a further dividend of 20 per cent will be paid when the amounts of the stockholders' liabilities are collected.

A general report of the secretary, relating to various matters of policy regarding the conduct of the association activities, was read by the secretary.

The annual report of the State Apiary Inspector for the period ending June 30, 1930, was read by Mr. A. L. Kildow of Putnam, and

on motion was accepted as read. This report showed a total of 7,685 apiaries visited with 90,581 colonies in which 6,231 colonies were found diseased. Of the diseased colonies, 2,791 were destroyed.

Following the opening business meeting, the regular program as outlined in the November-December bulletin was followed except that the scheduled talk of Francis Jager on November 19 was substituted for the discussion of Dr. R. C. J. Meyer of Hillsdale, Illinois. Father Jager discussed "Foulbrood Control, what are we going to do about it?" and Mr. F. X. Arnold of Deer Plain talked on "Fifty Years of Beekeeping in Calhoun County."

During the afternoon session of November 18, Mr. L. C. Dadant of Hamilton, Illinois, outlined the aims and purposes of the American Honey Institute and urged the cooperation of the association and individual beekeepers. Father Jager of St. Bonifacius, Minnesota, discussed the question of the benefits to be derived from cooperative production and marketing of honey. Mr. James Gwin, Honey Specialist of the Wisconsin Department of Agriculture, told the convention visitors of the action which the Wisconsin Department of Agriculture and Wisconsin beekeepers had taken in regard to the Mountain States Honey Producers' Association, the functioning of which organization was discussed by Mr. O. A. Lende.

Miss Ethel VanGilder, Superintendent of the Culinary Department of the State Fair, voiced her enthusiastic approval of the new sections of honey cookery originated in 1930 and pledged her help in making this feature one of real help to the beekeepers.

The annual banquet was held at the St. Nicholas Hotel at 6:30 p. m., on November 18 with Director S. E. Pierson of the Department of Agriculture, as the principal speaker. Following the banquet Mr. Jay Smith of Vincennes, Indiana, discussed the subject "Looking Forward."

The meeting of Wednesday, November 19, was called to order at 9:00 a. m., the election of officers being the first item of business. Vice-President, Louie Vannis of Harrisburg, was called to the chair to preside during the election of president. The following officers were elected by acclamation, there being no other nominations for the various positions: C. A. Mackelden, Jerseyville, President; Louie Vannis, Harrisburg, Vice-President; J. N. Koritz, Buckley, Vice-President; Benj. H. Fischer, Roanoke, Vice-President; A. G. Gill, Chicago, Vice-President; S. F. Peterson, East Moline, Vice-President; Elmer Kommer, Woodhull, Treasurer; and V. G. Milum, Vivarium Building, Champaign, Secretary.

It was moved by Wooldridge and seconded by S. F. Peterson that in the future, our association funds should be deposited in a National or Federal Reserve bank of recognized standing. Motion carried.

Moved, seconded, and carried that this association endorse the Legislative Committee to get the increased State appropriation being asked.

On motion by Mr. Pellett, seconded by Dr. Meyer, the association voted to empower the Executive Committee to transact all business during the interval from one annual meeting to the next without the approval of the association members. This power is conveyed by Article 6 of the By-laws of our Constitution.

Following the final business session, Father Frances Jager of Minnesota discussed "Foulbrood Control"; Mr. Frank C. Pellet, "Trend of the Time"; and Mr. Jay Smith of Vincennes, Indiana, the subject "What's What in Queen Rearing."

The fortieth annual convention adjourned at 11:45 a. m., November 19, 1930.

V. G. MILUM, *Secretary.*

RESOLUTIONS APPROVED AND ADOPTED AT THE FORTIETH ANNUAL CONVENTION HELD NOVEMBER 18-19, 1930.

Be it resolved, That the Illinois State Beekeepers' Association in convention assembled at Springfield on November 18-19, 1930, hereby resolves—

1. That we express our sincere appreciation for the untiring efforts of our board of officers to extend the influence of our organization and in cooperation with the State Inspection Service to advance the interests of the industry.

2. That we extend to the Hon. Stuart E. Pierson, Director of Agriculture, and his staff an expression of our satisfaction with the spirit of cordial cooperation extended to the beekeepers from his office.

We especially commend the present plan of housing the beekeeping exhibit in the proposed new Woman's Building at the State Fair.

3. That we render a vote of thanks to the visiting speakers, Jay Smith, Father Jager, James Gwin and O. A. Lende for their pleasant visits and inspiring addresses.

4. That we fully endorse the work of the American Honey Institute and urge the most generous and loyal support to that institution.

5. That we commend the efforts of the Mountain States Honey Producers' Association to secure orderly marketing of the honey crop and offer them our support and cooperation.

6. That we congratulate our worthy ex-Secretary J. A. Stone on his long and useful life, and unstinted service to this society.

7. That we convey to the management of the St. Nicholas Hotel our thanks for their hospitality and pleasant entertainment.

(Signed) FRANK C. PELLETT,
S. F. PETERSON,
Resolutions Committee.

(These resolutions read at business meeting November 19, 1930, by Mr. Pellett, who moved their adoption, which motion was carried.)

REPORT OF THE TREASURER FOR 1930.

WOODHULL, ILLINOIS, *November 18, 1930.*

To the Illinois State Beekeepers' Association—GREETINGS.

I herewith make my fifth annual report as Treasurer of the Illinois State Beekeepers' Association, subject to your approval.

RECEIPTS.

No.		
	Balance on hand at last convention	$323.50
(1)	January 13—Received from V. G. Milum, Secretary	35.00
(2)	January 13—Received from V. G. Milum, Secretary	15.50
(3)	February 10, 1930—Received from V. G. Milum, Secretary	37.50
(4)	February 10, 1930—Received from V. G. Milum, Secretary	14.50
(5)	March 1, 1930—Fred Meinen, Sec'y. N. W. Independent	5.00
(6)	March 21, 1930—Received from V. G. Milum, Secretary	31.50
	Total receipts to April 3, 1930	$462.50

EXPENDITURES.

Voucher No.		
(1)	December 21, 1929—American Honey Producers' League	$12.00
(2)	December 21, 1929—Elmer Kommer, Treasurer, expenses to annual meeting	22.12
(3)	December 21, 1929—V. G. Milum, banquet tickets	8.00
(4)	February 4, 1930—Troxell, Kikendall & Co., bonds	10.00
(5)	February 15, 1930—Chas. Kruse, balance on expenses	5.00
(6)	February 20, 1930—L. C. Dadant, American Honey Institute	25.00
(7)	February 20, 1930—V. G. Milum, 3 months' salary	50.00
(8)	February 20, 1930—Underwood Typewriter Co., exchange	15.00
	Total expenditures to April 3, 1930	$147.12

RECAPITULATION.

Total receipts	$462.50
Total expenditures	147.12
Balance on hand	$315.38

The above balance was on deposit in the Woodhull State Bank when doors closed April 3, 1930.

RECEIPTS—(Continued).

No.		
(7)	May 24—Troxell, Kikendall & Co., returned from bonds	$ 5.00
(8)	May 6—V. G. Milum, Secretary	31.00
(9)	May 6—V. G. Milum, Secretary	23.00
(10)	July 1—V. G. Milum, Secretary	15.50
(11)	August 6—V. G. Milum, Secretary	24.50
(12)	September 25—V. G. Milum, Secretary	34.50
(13)	October 1—A. S. Hamilton, receiver, Woodhull State Bank, 20 per cent dividend	63.08
(14)	November 17—V. G. Milum, Secretary, all dues inclusive to date	18.00
	Total receipts, April 3, 1930 to November 18, 1930	$214.58

EXPENDITURES—(Continued).

Voucher No.		
(9)	May 10—Elmer Kommer, executive meeting expenses, April 12.	$16.00
(10)	May 10—V. G. Milum, executive meeting.....	7.72
(11)	May 10—C. A. Mackelden, executive meeting.....	7.50
(12)	August 7—V. G. Milum, Secretary salary for 3 months.....	50.00
(13)	September 25—V. G. Milum, Secretary salary for 3 months...	50.00
(14)	November 5—V. G. Milum, Secretary salary for 3 months and flowers to A. L. Kildow.....	55.00
	Total expenditures, April 3, 1930 to November 18, 1930...	$186.22

RECAPITULATION.

Total receipts	$214.58
Total expenditures	186.22
Balance on hand.....	$28.36

This balance represented by a deposit of $10.36 and check for $18.00 attached to this report.

(Signed) ELMER KOMMER, *Treasurer,*
Illinois State Beekeepers' Association.

November 18, 1930.

We, the Auditing Committee, have examined these records and have found them correct.

(Signed) LOUIE VANNIS,
E. F. PETERSON,
Auditing Committee.

FINANCIAL REPORT OF THE SECRETARY FOR PERIOD BEGINNING DECEMBER 4, 1929 AND ENDING NOVEMBER 18, 1930.

RECEIPTS.

Balance in treasury at last convention, December 3-4, 1929..... $323.50

Received by Secretary and transmitted to Treasurer or received by Treasurer direct according to the following Membership Dues Receipt Numbers:

Receipt number.	Date received by treasurer.	Description.	Amount received by secretary.	Remitted for Bee Journals.	Remitted to treasurer.
No. 1	January 13	Members at Large	$41.00	$10.50	
		Peoria Co. Assn	1.00		
		Christian Co Assn	1.00		
		Cook-DuPage Co. Assn	2.00		
		Saline-Gallatin Co. Assn	.50		
			$45.50	$10.50	$35.00
No. 2	January 13	Stephenson Co. Assn	5.50		
		DeKalb Co. Assn	5.00		
		Warren Co. Assn	5.50		
			$15.50		$15.50
No. 3	February 10	Members at Large	$12.50	$ .50	
		Saline-Gallatin Co. Assn	5.00		
		Piatt Co. Assn	7.00		
		Champaign Co. Assn	3.50	1.00	
		Will Co. Assn	7.50	1.50	
		JoDaviess Co. Assn	5.00	2.50	
		Jersey Co. Assn	2.50		
			$43.00	$5.50	$37.50
No. 4	February 10	Henry Co. Assn	10.00		
		Hancock Co. Assn	.50		
		Cook-DuPage Co. Assn	4.00		
			$14.50		$14.50
No. 5	March 1	Northwest Independent Assn	5.00		5.00
			$5.00 (to treas.)		
No. 6	March 2	Members at Large	$10.50	.50	
		Jersey Co. Assn	1.50		
		Cook-DuPage Co. Assn	12.50		
		DeKalb Co. Assn	1.00		
		Saline-Gallatin Co. Assn	.50		
		Woodford Co. Assn	2.50		
		Iroquois Co. Assn	4.00	.50	
			$32.50	$1.00	$31.50

Total receipts to April 3, 1930, date of failure of Woodhull State Bank $462.50

EXPENDITURES.

No. 1—December 21, 1929—American Honey Producers' League affiliation fee $12.00

No. 2—December 21, 1929—Elmer Kommer, Treasurer, expenses to annual meeting 22.12

No. 3—December 21, 1929—V. G. Milum, banquet tickets..... 8.00

No. 4—February 15, 1930—Troxell, Kikendall & Company, bonds.... 10.00

No. 5—February 14, 1930—Charles Kruse, balance on expenses..... 5.00

No. 6—February 20, 1930—American Honey Institute, contribution..	25.00
No. 7—February 20, 1930—V. G. Milum, 3 months salary.....	50.00
No. 8—February 20, 1930—Underwood Typewriter Co., exchange....	15.00
Total expenditures to April 3, 1930.....	$147.12

RECAPITULATION.

Total receipts	$462.50
Total expenditures	147.12
Balance on hand.....	$315.38

The above balance was on deposit in the Woodhull State Bank when doors closed April 3, 1930.

RECEIPTS—(Continued).

Receipt number.	Date received by treasurer.	Description.	Amount received by secretary.	Remitted for Bee Journals.	Remitted to treasurer.
No. 7	May 22	Returned from premium for bonds by Troxell, Kikendall & Company	(5.00 to treas.)		$5.00
No. 8	May 6	Members at Large	3.00		3.00
		Champaign Co. Assn	1.00		1.00
		McLean Co. Assn	1.50		1.50
		Jersey Co. Assn	1.50		1.50
		DeKalb Co. Assn	1.00	$0.50	.50
		Piatt Co. Assn	2.00		2.00
		Jefferson Co. Assn	2.00		2.00
		Henry Co. Assn	1.00		1.00
		Ogle-Lee Co. Assn	4.50		4.50
		Shelby Co. Assn	.50		.50
		Saline-Gallatin Co. Assn	1.00		1.00
		Fulton Co. Assn	4.00		4.00
		Cook-DuPage Co. Assn	8.50		8.50
			$31.50	$0.50	$31.00
No. 9	May 6	Members at Large	1.00		
		Lake-McHenry Co. Assn	12.50		
		Montgomery Co. Assn	6.00		
		JoDaviess Co. Assn	6.00	2.50	
			$25.50	$2.50	23.00
No. 10	July 1	Members at Large	1.00		
		Peoria Co. Assn	6.00		
		Saline-Gallatin Co. Assn	2.00		
		Woodford Co. Assn	1.00		
		Franklin Co. Assn	3.50		
		Montgomery Co. Assn	1.50		
		Will Co. Assn	1.00	.50	
			$16.00	$0.50	15.50
No. 11	August 6	Members at Large	2.50	.50	
		Franklin Co. Assn	1.00		
		JoDaviess Co. Assn	1.50		
		Henry Co. Assn	2.00		
		Saline-Gallatin Co. Assn	2.00		
		Iroquois Co. Assn	1.50		
		Lake-McHenry Co. Assn	14.00		
		Champaign Co. Assn	1.00	.50	
			$25.50	$1.00	24.50
No. 12	September 25	Members at Large	7.00		
		Jersey Co. Assn	3.00		
		Henry Co. Assn	1.00		
		McLean Co. Assn	1.00		
		Peoria Co. Assn	1.50		
		Franklin Co. Assn	.50		
		Lake-McHenry Co	1.00		
		Mercer Co. Assn	7.50		
		Cook-DuPage Co. Assn	8.50		
		DeKalb Co. Assn	3.00	.50	
		JoDaviess Co. Assn	2.00	1.00	
			$36.00	$1.50	34.50

RECEIPTS—(Concluded).

Receipt number.	Date received by treasurer.	Description.	Amount received by secretary.	Remitted for Bee Journals.	Remitted to treasurer.
No. 13	October 1	Dividend 20% from Woodhull State Bank	($63.08 to treas.)		63.08
No. 14	November 18	Jersey Co. Assn	$0.50		
		Ogle-Lee Co. Assn	2.00		
		Woodford Co. Assn	5.50		
		Lake-McHenry Co. Assn	3.50		
		McLean Co. Assn	3.00		
		Champaign Co. Assn	1 00		
		Montgomery Co. Assn	1 50		
		Members at Large	1 00		
			$18 00		18 00
		Total receipts	$220 58	$6 00	$214 58

EXPENDITURES—(Continued).

No. 9—May 10, 1930—Elmer Kommer, executive meeting expenses, April 12	$16.00
No. 10—May 10, 1930—V. G. Milum, executive meeting	7.72
No. 11—May 10, 1930—C. A. Mackelden, executive meeting	7.50
No. 12—August 7, 1930—V. G. Milum, Secretary's salary for 3 months	50.00
No. 13—September 25, 1930—V. G. Milum, Secretary's salary for 3 months	50.00
No. 14—November 5, 1930—V. G. Milum, 3 months salary and flowers to A. L. Kildow	55.00
Total expenditures, April 3, 1930 to November 18, 1930	$186.22

RECAPITULATION.

Total receipts April 3, 1930 to November 18, 1930	$214.58
Total expenditures, April 3 1930 to November 18, 1930	186.22
Balance on hand November 18, 1930	$28.36

(Signed) V. G. MILUM, *Secretary,*
Illinois State Beekeepers' Association.

November 18, 1930.

We, the Auditing Committee, upon examination of the books of the Secretary and the Treasurer of the Illinois State Beekeepers' Association, find them correct.

(Signed) E. F. PETERSON,
LOUIE VANNIS,
Auditing Committee.

GENERAL REPORT OF THE SECRETARY FOR THE PERIOD BEGINNING DECEMBER 4, 1929 AND ENDING NOVEMBER 18, 1930.

(V. G. Milum, Champaign.)

In making my general report at the last convention a number of facts and suggestions were offered for your consideration. These were published in the 1929 report which should have barely reached you before your departure for this convention. Again this year there are further items for your consideration.

The Annual Report.

As explained in the November-December or convention program number of our bulletin, we were unable to secure the approval of the printing requisition for the 1929 report until after July 1 in spite of the fact that our material was ready for the printers around March 15. This was due to the fact that the funds to cover the cost of the printing were not available until after July 1, which meant a delay of about three and one-half months. This condition has been brought about by increased activities of the secretary's office especially in regard to our bulletin which was sent out monthly for a period of about two years and expenses incurred in connection with our annual meetings.

The result was that at the beginning of the present biennium on July 1, 1929 we had a carry over of $349.00 for the 1928 report which should have been paid from the appropriation for this previous biennium, which in itself had been depleted slightly by a carry over from the next preceding biennium.

An itemized statement of our expenditures from this appropriation and the estimated expenditures to June 30, 1931, the close of the biennium has been prepared and will be posted for your information. This shows expenditures of $1,104.68 to date from our appropriation of $2,000.00 for "Publishing and Distributing Reports, Expenses of State Fair Exhibits, etc.," with an estimated further expenditure in the biennium of $760.00 including something over $600.00 due on our 1929 report. This would leave a balance of $135.22 on June 30, 1931 which can be vouchered from until September 1. This amount is all there is available for the 1930 report on which the Director of Finance will probably refuse to issue the printing requisition until after July 1, 1931.

Of our appropriation of $400.00 for "Shorthand Reporter and Compiling Reports," the statement shows expenditures of $239.24 to date leaving a balance of $170.76, which is apparently ample to take care of stenographic and clerical work for the present biennium.

But on the whole question of this appropriation, we need the active support and advice of our membership. In submitting our budget on

September 15 for the 1931-1933 biennium, we included an additional $300.00 for each year or a total of $3,000.00 per biennium and also asked for a special appropriation of $600.00 to take care of the 1930 report early in 1931. It is unlikely that these increases will be granted without some definite action and support of our membership.

If we must continue under our present system, then the 1930 report must go unprinted or else wait as this year.

The Association Bulletin.

Owing to lack of finances as explained previously, it has been necessary during the past year to reduce the issuing of the association bulletin from once each month to once each two months which apparently meets the needs of our association. Under the present system with six publications during the year, according to the ruling of the post office department, the bulletins must be mailed during the months of January, March, May, July, September, and November. If it is the desire of our membership to return to the monthly basis some recommendation should be made at this convention and considered under the discussion of our State appropriation.

Our Membership.

Our actual paid up membership since the last convention totals 488 members as compared with 527 in 1929 and 545 in 1928. Our actual membership on November 18 is 542, which includes 35 members whose membership expires between November 18 and December 1, the approximate date of our last convention, and 19 members who were paid in advance in 1929. This total of 542 is an increase over our actual membership of 505 at convention time last year of 37 members. If our local associations and other agencies had given full support our total membership should have been considerably increased.

Of the 427 members who have paid their dues since the last convention and our present membership of 542, 160 of these or 30 per cent are new members for the first time within the past year. What about our previous members?—227 have allowed their memberships to expire during the past year. Of this latter number, 85 were members for only one year. Why not keep them? Do you have any suggestions?

A list showing the source of our membership will be posted and you are asked to study it. (See membership report by counties for 1928 to 1931, page 22 of this report.)

The American Honey Producers' League.

At the last convention the association voted to join the American Honey Producers' League at an annual fee of $12.00 per year for membership. Unless further action is taken at this convention it is assumed that our association is to continue its membership and your secretary urges that it do so. The annual meeting of the American Honey Producers' League, the American Honey Institute, and the Apiary Inspectors of America will be held at Toronto, Canada on February 9 to 12. It is suggested that some arrangements be made for the association to be represented at the league meeting.

The American Honey Institute.

Last year our association voted to support the American Honey Institute in its program of honey extension to the amount of $25.00. This amount was increased by contributions of a few Illinois beekeepers to make a total of $52.00. Your secretary is of the opinion that the American Honey Institute is doing a lot of wonderful work for the beekeepers of America and its program deserves the whole-hearted support of the rank and file of beekeepers. One of our speakers will tell you of the work of the American Honey Institute and we urge your sincere consideration and cooperation in whatever plans are suggested. While our association finances do not permit of much assistance to the American Honey Institute, the rank and file of beekeepers should materially assist it in its program of placing honey ideas in the minds of the American housewife. For your information there has been posted on one of the wall charts considerable of the type of information that is being sent out by the American Honey Institute. Look this over carefully and see what is being done to help the cause. (Lists of the 1930 and 1931 contributors to the American Honey Institute are given in another part of this report.)

Our Association Finances.

At the last convention on motion of the treasurer the secretary was instructed to take steps to secure fidelity bonds for the treasurer and secretary and depository bonds for our association funds proper which were then on deposit in the Woodhull State Bank. Owing to other work and certain delays the forms were finally mailed to Treasurer Kommer about February 10, who in turn mailed them to the insurance agents, Troxell, Kikendall & Company, Springfield, on February 15. However, the Woodhull State Bank had failed to supply all of the information on the application blanks required by the bonding company and the blanks were returned to the bank on February 26. The bank apparently refused to supply all the information for the agents notified us under date of March 20 that the bank could not be bonded. This letter was forwarded to Mr. Kommer and under date of April 2, President Mackelden advised Treasurer Kommer to withdraw the association funds from the bank but upon the arrival of Mr. Kommer at the bank on the morning of April 3, the doors were closed by order of the State Bank Examiner.

It is apparent that the secretary is to blame somewhat for this condition because of his laxity in getting out the application blanks but there was delay all along the line, including the bank's slowness and lack of information in filling the application blanks.

To date, the association has received one 20 per cent dividend amounting to $63.08 which leaves us with a balance still unpaid of $252.30. It is expected that there will be further dividends since the amounts of the stockholders' liabilities have not been collected.

Date of Our Annual Convention.

The National Beekeepers' Meetings Schedule Committee, with Mr. James I. Hambleton, as chairman, has suggested a series of meetings in which Illinois is included in a group of states ranging from West Vir-

ginia to Nebraska. Illinois is assigned the dates of January 26 and 27. It is your secretary's opinion that this is a little bit too late in the winter for our convenience. Another series including a northern group of states starts in October for this section of the country. This group would probably be more desirable for our association meeting if we could secure a place in the schedule.

The idea of this Schedule Committee is to arrange the meetings in a series of states in order that speakers may travel from one meeting to another in adjoining states with a minimum of expense. If these series are finally approved Illinois has best be in them at some point else it may be at times hard to secure speakers. The suggested schedule will be posted and our final business meeting ought to take some action and make recommendations.

REGISTERED ATTENDANCE AT 40TH ANNUAL MEETING OF THE ILLINOIS STATE BEEKEEPERS' ASSOCIATION AT SPRINGFIELD, ILLINOIS, NOVEMBER 18-19, 1930.

Name.	Address.	County.	Number of colonies.	Comb or extracted honey.
W. H. Force	Champaign	Champaign		
C. A. Mackelden	Jerseyville	Jersey	30	Comb.
Mrs. C. A. Mackelden	Jerseyville	Jersey		
Jas. A. Stone	Farmingdale	Sangamon		Extracted.
Edwin Kommer	Andover	Henry	160	Both.
Dr. R. C. J. Meyer	Hillsdale	Rock Island	70	Both.
H. A. Luer	Jerseyville	Jersey	25	Both.
S. A. Tyler	San Jose	Logan	250	Both.
A. E. Thomas	Secor	Woodford	50	Extracted
O. W. Kennett	Ohlman	Montgomery	42	Extracted
Edna Kennett	Ohlman	Montgomery		
C. J. Anderson	Morris	Grundy	130	Extracted
Fred F. Bellatti	Mt. Pulaski	Logan	45	Both.
W. G. Mueller	Bluffs	Scott	148	Both.
Ralph McInnes	Sidney	Champaign	63	Both.
Benj. H. Fischer	Roanoke	Woodford	55	Extracted.
Lawrence Peterson	Kewanee	Henry	200	Both.
Emory Warner	Monticello	Piatt	150	Both.
Philip Krebs	Marissa	St. Clair	185	
Walter Krebs	Marissa	St. Clair		
J. H. Bearden	Taylorville	Christian	46	Both.
Mrs. J. H. Bearden	Taylorville	Christian		
B. F. Bell	Kingston Mines	Peoria	335	Both.
Mrs. Paradine Bell	Kingston Mines	Peoria		
J. Dineen	Springfield	Sangamon		
Louis Vannis	Harrisburg	Saline	50	Comb.
Rose Vannis	Harrisburg	Saline		
Frank Bishop	Taylorville	Christian	150	Both.
J. W. Klein	Freeburg	St. Clair	32	Extracted.
Hy. J. Hummert	Fayetteville	St. Clair	56	Both.
W. A. Brewer	Atwood	Piatt	80	Both.
J. N. Koritz	Buckley	Iroquois	90	Both.
B. W. Boyer	Jerseyville	Jersey	30	Both.
Emma Boyer	Jerseyville	Jersey		Both.
S. F. Peterson	East Moline	Rock Island	40	Both.
Ruby Peterson	East Moline	Rock Island		
Elmer A. Gieszelmann	Granite City	Madison	30	Both.
Edward L. Gieszelmann	Granite City	Madison		
Fred E. Hoenes	Beardstown	Cass	70	Comb.
Wesley W. Osborn	Hillsboro	Montgomery	5	Extracted.
Francis Jager	St. Bonifacius, Minn		250	Both.
Elmer Kommer	Woodhull	Henry	75	Both.
A. G. Gill	Chicago	Cook	1	Comb.
O. A. Lende	Minneapolis, Minn			
Arthur P. Holt	Springfield	Sangamon		
F. X. Arnold	Deer Plain	Calhoun	156	Comb.
Mrs. F. X. Arnold	Deer Plain	Calhoun		
James Gwin	Madison, Wis			

OUR 1931 MEMBERSHIP BY COUNTIES.

County.	Paid in membership.				Secretary.	Address.
	1928	1929	1930	1931*		
Champaign	7	10	10	18	V. G. Milum	Vivarium Bldg., Champaign.
Christian	2	0	0	0		
Cook-DuPage	76	84	69	56	E. J. McCormick	6810 S. Winchester, Chicago.
DeKalb	27	26	18	19	Carl H. Tudor	Route 2, Sycamore.
Ford (Organized March 6, 1931)				8	C. E. Harper	Paxton.
Franklin	2	2	10	1	John Matelic(?)	2102 E. Main St., W. Frankfort.
Fulton	14	12	8	8	J. E. Watts	Canton.
Grundy	8	8	0	0		
Hancock	16	9	1	12	M. G. Dadant	Hamilton.
Henry	41	39	28	33	Elmer Kommer	Woodhull.
Iroquois	16	10	10	11	H. L. Dunn	Onarga.
Jefferson	15	10	4	10	C. F. Anderson	R. 5, Mt. Vernon.
Jersey (1927, 18)		17	18	8	C. A. Mackelden	Jerseyville.
JoDaviess	16	18	17	15	Ed. Jeffery	Galena.
Kane	13	0	0	0		
LaSalle-Bureau (Organized Jan. 21)				22	Henry W. Hoffman	1826 N. Peoria St., Peru.
McHenry-Lake	16	9	62	84	C. P. Jankowski	Gurnee.
McLean	15	10	11	19	Glenn L. Hargitt	Danvers.
Macon (Organized in 1931)				50	G. Murray Morris	645 W. Leafland St., Decatur.
Mercer	26	14	15	9	W. C. Egbert	Aledo.
Moultrie	0	3	0	0		
Montgomery	12	10	16	16	Wesley W. Osborn	Hillsboro.
Morgan-Scott (Organized Dec. 12, 1930)				16	Lawrence W. Fisher	Woodson.
N. W. Independent	12	10	10	4	Fred Meinen	Baileyville.
Ogle-Lee	11	13	12	13	Miss E. Ordnung	Oregon.
Peoria	19	2	17	14	Mrs. M. F. Johnson	418 S. Adams St., Peoria.
Piatt	22	18	18	12	Emory Warner	Monticello.
Rock Island	34	29	28	30	S. T. Peterson	2326 Third Ave., East Moline.
Saline-Gallatin	12	15	22	24	Alvin Bell	Ridgway.
Shelby	21	0	1	23	C. E. Hill	R. 1, Windsor.
Stark (Organized July 9, 1931)				16	Everett Price	Toulon.
Stevenson	10	10	10	14	W. H. McCaffrey	104 E. Stevenson St., Freeport.
Warren	3	10	10	10	Glenn Glass	Cameron.
Whiteside	11	14	0	0		
Will	10	1	13	13	A. J. Polcyn	315 Huchins St., Joliet.
Williamson	10	1	0	0		
Woodford	17	16	18	14	A. E. Thomas	Secor.
County total	492	451	427	602		
Members at large	53	76	61	86		
Entire State	545	527	488	688		
Actual members	545	505	542			

NOTE.—The 1931 totals were corrected to February 1, 1932, because of some 1931 dues being received after November 17, the close of the year between two annual conventions. The actual number of membership dues received between November 18, 1930 and November 17, 1931 was 656 as compared with 488, 527 and 545 of the years 1930, 1929 and 1928, respectively.

1931 MEMBERS AT LARGE BY COUNTIES.

Bureau	2	LaSalle	1	Sangamon	5
Carroll	1	Livingston	1	Schuyler	1
Cass	1	Logan	3	Shelby	1
Champaign	1	Macon	1	St. Clair	4
Christian	3	Macoupin	1	Tazewell	1
Clark	1	Madison	1	Vermilion	2
Cook	8	Marion	1	Whiteside	4
DeKalb	1	Marshall	1	Woodford	1
DeWitt	1	McHenry	1	Alabama	1
Edgar	1	Morgan	1	Minnesota	1
Grundy	9	Moultrie	1	Mississippi	1
Iroquois	3	Ogle	2	New Jersey	1
Jackson	3	Randolph	2	Pennsylvania	1
Jefferson	1	Saline	1	Texas	1
Lake	1			England	1

MINUTES OF THE FORTY-FIRST ANNUAL CONVENTION OF THE ILLINOIS STATE BEEKEEPERS' ASSOCIATION, SPRINGFIELD, ILLINOIS, NOVEMBER 17-18, 1931.

The forty-first annual convention of the Illinois State Beekeepers' Association, held in the parlors of the St. Nicholas Hotel, Springfield, Illinois, was called to order at 10:00 a. m., November 17, by the President, C. A. Mackelden of Jerseyville. The minutes of the last meeting were read and approved.

The following committees were appointed by Mr. Mackelden: Auditing—S. A. Tyler, San Jose, and Emory Warner, Monticello; Resolutions—W. W. Osborn, Hillsboro, and C. J. Anderson, Morris; Banquet—Ed. Kommer, Cambridge, and H. L. Dunn, Onarga; Question Box—A. E. Thomas, Secor, and B. F. Bell, Kingston Mines.

The financial reports of the secretary and treasurer were read by V. G. Milum and Elmer Kommer, respectively, and referred to the auditing committee, who at the final business session on the last day of the convention reported them correct and moved their adoption, which action was taken.

These reports showed a total of $496.94 received during the year with total expenditures of $305.34, leaving a balance on hand at convention time of $191.60 as compared to a balance of $28.36 at the 1930 convention.

The general report of the secretary relating to various matters of policy regarding the conduct of Association activities was read and on motion, adopted.

The annual report of the State Apiary Inspector was read by A. L. Kildow of Putnam and accepted by vote of the convention.

Following the business session on the opening day of the convention, Mr. J. H. McClure of Murrayville, Illinois, spoke on the subject "The Queen and Her Equipment." The afternoon of the first day was given over entirely to discussions by the following: Roy A. Grout, Hamilton, Illinois, "Tongue Length and Its Relation to Honey Storage;" R. S. Marsh, Horticultural Extension Specialist, Urbana, Illinois, "Using Bees in Illinois Orchards;" E. R. Root, Medina, Ohio, "The Old Versus the New in Beekeeping."

Following these discussions questions from the question box were read and answered by those in attendance, the afternoon session adjourning at 5:00 p. m.

The annual banquet was held at 6:30 p. m. with an attendance of 70 and a good program of entertainment. The Honorable Homer J. Tice of Greenview, Illinois, Representative in the General Assembly

and Chairman of the House Appropriations Committee, gave an interesting address in which he eulogized the beekeeping industry and its product and urged a further development of the State Fair Premium List, including a class for amateur exhibitors. Others present who were called upon to give short addresses were the Honorable William H. Jackson, Toulon, Representative in the General Assembly; Mr. John H. Craig, Assistant Director of Agriculture; Mr. H. L. Williamson, Superintendent of Printing; Mr. Stanley Smith, Publicity Division, State Capitol; Dr. Wm. C. Wilson of St. Charles, Missouri, and E. R. Root of Medina, Ohio. A musical program was also included through the kind services of Nona and Ivan Annear of Mulkeytown and C. L. Duax of Chicago. Mr. G. L. Sauer of Polo, Illinois, rendered an interesting poem entitled "The Honeybee."

The second day of the convention was called to order at 9:15 a. m. November 18 by President Mackelden. After further questions and answers and discussions by the "Ten Minute Men," the election of officers was in order, which resulted in the choice of the entire previous group of 1931 for another year, these being C. A. Mackelden, Jerseyville, President; Vice-Presidents, Louie Vannis, Harrisburg; J. M. Koritz, Buckley; Benj. H. Fischer, Roanoke; A. G. Gill, Chicago, and S. F. Peterson, East Moline; Treasurer, Elmer Kommer, Woodhull, and Secretary, V. G. Milum, Champaign.

On motion by Mr. Tyler, duly seconded and carried, the Association pledged itself the amount of $5.00 per month to the American Honey Institute for 1932, if and when the American Honey Institute is definitely separated from the corn sugar interests.

Following the morning recess Mr. E. R. Root of Medina, Ohio, spoke on "The Romance of Sweet Clover" and Dr. Wm. C. Wilson of St. Charles, Missouri, on "Enjoying Life with Biz and Bees." The morning session adjourned at 11:45 a. m.

The final afternoon session of the convention convened at 1:30 p. m.

The report of the State Fair Committee was read by the chairman, Mr. C. F. Earle of Dalton City and adopted by vote of the convention. These recommendations include an increase in amounts of the premiums in the bee and honey exhibit at the State Fair, the addition of Caucasian and Carniolan bees, the exclusion of out-of-state honey, more space for honey at the fair and the establishment of an amateur class.

Further afternoon discussions were given by Mr. H. C. Dadant of Hamilton, Illinois, on "Factors Influencing the Market for Beeswax and Honey" and Dr. Wilson on "Short Cuts and Side Lights on Beekeeping."

President Mackelden appointed the following as members of the Legislative Committee for 1932: A. L. Kildow, V. G. Milum, Elmer Kommer, and Louie Vannis.

The meeting adjourned at 3:30 p. m., November 18, 1931.

V. G. MILUM, *Secretary.*

RESOLUTIONS APPROVED AND ADOPTED AT THE FORTY-FIRST ANNUAL CONVENTION HELD NOVEMBER 17-18, 1931.

Be it resolved, That the Illinois State Beekeepers' Association in its forty-first annual convention assembled at Springfield, Illinois, November 17-18, 1931, hereby approve and adopt the following resolutions, and

Be it further resolved, That a copy of same be spread upon the records and copies sent to the various appropriate authorities concerned:

1. *Be it resolved,* That a vote of thanks be extended to the State Agricultural Department, especially to the State Fair Division, and to Miss Ethel Van Gilder, Superintendent of the Culinary Department, for the fine cooperation in the promotion of the use of honey through the inclusion of honey items in the premium list.

2. *Be it resolved,* That a vote of thanks be extended to the authorities of the St. Nicholas Hotel for their continued courtesy and cooperation in allowing the use of the hotel parlors for our meetings and for other services rendered.

3. *Be it resolved,* That the members of this association hereby extend a vote of thanks to all those who have taken part in its meetings, contributing of their time and efforts to make it a success.

4. WHEREAS, Each industry of national importance maintains a system of national advertising calculated to advocate and promote the use and demand for their products, and

WHEREAS, The American Honey Institute is the only organization rendering or seeking to render this service for honey.

Be it resolved, That the members of the Illinois State Beekeepers' Association, in convention assembled, heartily approve of the American Honey Institute and its work, and

Be it further resolved, That this association manifest its approval in a material way.

5. WHEREAS, During the past year several of our members have been called to their eternal reward,

Be it resolved, That the Illinois State Beekeepers' Association, in convention assembled, take suitable action to indicate our respect to their memory.

(Signed) W. W. OSBORNE,
C. J. ANDERSON,
Resolution Committee.

(The above resolutions were read by Mr. Osborne and on his motion were accepted as read. The members present then stood with bowed heads for one minute in respect to the memory of our deceased members as suggested in Resolution 5.)

REPORT OF THE TREASURER FOR 1931.

WOODHULL, ILLINOIS, *November 17, 1931.*

To the Illinois State Beekeepers' Association—GREETINGS.

I herewith make my sixth annual report as Treasurer of the Illinois State Beekeepers' Association, subject to your approval.

RECEIPTS.

No.		
	Balance on hand at last convention	$28.36
1	January 3—Received from V. G. Milum, Secretary	49.00
2	January 31—Received from V. G. Milum, Secretary	46.00
3 and 4	April 17—Received from V. G. Milum, Secretary	84.50
5	May 5—Received from A. S. Hamilton, Receiver	63.08
6	May 28—Received from V. G. Milum, Secretary	25.00
7	July 1—Received from V. G. Milum, Secretary	43.50
8	August 21—Received from V. G. Milum, Secretary	42.00
9	August—Received from V. G. Milum, Secretary	39.00
10	October 27—Received from V. G. Milum, Secretary	31.00
	March 4—Received from V. G. Milum, returned league check	12.00
11	November 17—Received from V. G. Milum, Secretary	33.50
	Total receipts	$496.94

EXPENDITURES.

Voucher No.		
(1)	December 11, 1930—C. A. Mackelden, expense to annual convention	$ 8.80
(2)	December 11, 1930—Elmer Kommer, expense to annual convention	10.00
(3)	December 11, 1930—V. G. Milum, expense to annual convention	27.37
(4)	February 5, 1931—J. A. Munro, membership to league	12.00
(5)	February 18—V. G. Milum, 3 months' salary	50.00
(6)	April 18—V. G. Milum, expense to Springfield to attend Finance Committee hearing	8.27
(7)	May 30—V. G. Milum, 3 months' salary	50.00
(8)	September 9—V. G. Milum, 3 months' salary	50.00
(9)	September 9—V. G. Milum, expense to executive meeting	13.70
(10)	September 9—Elmer Kommer, expense to executive meeting	18.20
(11)	September 9—C. A. Mackelden, expense to executive meeting	7.00
(12)	October 1—Post office money order for $100.00 held by Treasurer of association.	
(13)	October 8—V. G. Milum, 3 months' salary	50.00
	Total expenditures during term	$305.34

RECAPITULATION.

Total receipts	$496.94
Total expenditures	305.34
Balance on hand	$191.60

Owing to the several bank failures in this county since last convention I have our funds as follows:

Postal money order	$100.00
Balance in Farmers National Bank, Cambridge	26.10
Uncashed check from V. G. Milum, October 27, 1931	31.00
Uncashed check from V. G. Milum, November 17, 1931	34.50
	$191.60

(Signed) ELMER KOMMER, *Treasurer,*
Illinois State Beekeepers' Association.

November 18, 1931.

We, the Auditing Committee, have examined these records and have found them correct.

(Signed) S. A. TYLER,
EMORY WARNER,
Auditing Committee.

FINANCIAL REPORT OF THE SECRETARY FOR PERIOD BEGINNING NOVEMBER 18, 1930 AND ENDING NOVEMBER 17, 1931.

RECEIPTS.

Balance in treasury at last convention, November 18-19, 1930..... $28.36

Received by Secretary and transmitted to Treasurer or received by Treasurer direct according to the following Membership Dues Receipt Numbers:

Receipt number.	Date received by treasurer.	Description.	Amount received by secretary.	Remitted for Bee Journals.	Remitted to treasurer.
No. 1	January 3	Members at Large	$38.25	$5.75	
		Jersey Co. Assn	2.50	.50	
		Piatt Co. Assn	.50		
		Rock Island Co. Assn	14.00		
			$55.25	$6.25	$49.00
No. 2	January 31	DeKalb Co. Assn	4.00		
		Saline-Gallatin Co. Assn	1.00	.50	
		Warren Co. Assn	5.00		
		Stephenson Co. Assn	6.00		
		Morgan-Scott Co. Assn	3.00		
		Peoria Co. Assn	3.50		
		Woodford Co. Assn	1.00		
		Macon Co. Assn	13.50		
		JoDaviess Co. Assn	8.00	4.00	
		Hancock Co. Assn	5.50		
			$50.50	$4.50	46.00
No. 3	April 17	Cook-DuPage Co. Assn	11.50		
		Henry Co. Assn	12.50		
		Morgan-Scott Co. Assn	2.50		
		LaSalle-Bureau Co. Assn	9.00		
		Piatt Co. Assn	5.50		
			$41.00	$0.00	41.00
No. 4	April 17	Ogle-Lee County	.50		
		Champaign Co. Assn	5.50		
		Saline-Gallatin Co. Assn	4.00		
		Iroquois Co. Assn	3.00		
		Ford Co. Assn	4.00		
		Woodford Co. Assn	2.00		
		Jersey Co. Assn	1.00		
		Peoria Co. Assn	2.00		
		Members at Large	23.50	2.00	
			$45.50	$2.00	43.50
No. 5	May 7	20% dividend on $315.38	($63.08 to treas.)		63.08
No. 6	May 28	JoDaviess Co. Assn	2.50	1.00	
		Northwest Independent Assn	.50		
		DeKalb Co. Assn	2.00	.50	
		Whiteside Co. Assn	5.50	1.00	
		Cook-DuPage Co. Assn	4.00		
		Ogle-Lee Co. Assn	3.50		
		Stephenson Co. Assn	1.00		
		Iroquois Co. Assn	.50		
		Morgan-Scott Co. Assn	1.50		
		Shelby Co. Assn	.50		
		Champaign Co. Assn	1.00		
		Members at Large	5.50	.50	
			$28.00	$3.00	25.00

RECEIPTS—(Concluded).

Receipt number.	Date received by treasurer.	Description.	Amount received by secretary.	Remitted for Bee Journals.	Remitted to treasurer.
No. 7	July 1	McLean Co. Assn	7.00		
		LaSalle-Bureau Co. Assn	2.00		
		Iroquois Co. Assn	1.00		
		Woodford Co. Assn	1.00		
		Lake-McHenry Co. Assn	8.00		
		Cook-DuPage Co. Assn	.50		
		Saline-Gallatin Co. Assn	5.00		
		Shelby Co. Assn	6.50		
		Macon Co. Assn	7.00		
		Will Co. Assn	6.50	1.00	
			$44.50	$1.00	43.50
No. 8	August 21	Henry Co. Assn	1.00		
		Montgomery Co. Assn	6.00		
		Saline-Gallatin Co. Assn	2.50		
		Iroquois Co. Assn	1.00		
		Jefferson Co. Assn	1.00		
		Hancock Co. Assn	.50		
		Will Co. Assn	.50		
		Lake-McHenry Co. Assn	17.50		
		Members at Large	13.50	1.50	
			$43.50	$1.50	42.00
No. 9	September 26	Woodford Co. Assn	2.00		
		Macon Co. Assn	3.00		
		Lake-McHenry Co. Assn	16.50		
		Jefferson Co. Assn	4.50		
		Cook-DuPage Co. Assn	8.00		
		Saline-Gallatin Co. Assn	.50		
		Champaign Co. Assn	6.00	1.50	
			$40.50	$1.50	39.0
No. 10	October 27	McLean Co. Assn	2.50		
		Northwest Independent Assn	1.50		
		Shelby Co. Assn	4.00		
		Stark Co. Assn	8.00		
		Cook-DuPage Assn	2.50		
		Tri-Co. Assn	2.50		
		Peoria Co. Assn	1.00	.50	
		Members at Large	11.50	2.00	
			$33.50	$2.50	31.00
No. 11		Henry Co. Assn	3.00		
		Morgan-Scott Co. Assn	1.00		
		Macon Co. Assn	1.50		
		Fulton Co. Assn	3.00		
		Montgomery Co. Assn	2.00		
		Woodford Co. Assn	.50		
		Jersey Co. Assn	1.50		
		Peoria Co. Assn	1.00		
		Will Co. Assn	.50		
		Rock Island Co. Assn	15.00		
		Shelby Co. Assn	.50		
		Members at Large	4.00		
			$33.50	$00.00	33.50
			$478.83	$22.25	$456.58

Totals received by Secretary and Treasurer	$478.83
Remitted by Secretary for Bee Journals	22.25
Total received or remitted to Treasurer	$456.58
Balance on hand November 18, 1930	28.36
Total receipts for year ending November 17, 1931	$484.94

EXPENDITURES.

From November 18, 1930, to November 17, 1931, by vouchers as follows:

No. 1—December 2, 1930—C. A. Mackelden, expenses to 1930 annual convention	$ 8.80
No. 2—December 2, 1930—Elmer Kommer, expenses to 1930 annual convention	10.00
No. 3—December 2, 1930—V. G. Milum, expenses to annual convention and banquet tickets furnished to speakers	27.37
No. 4—January 28, 1931—American Honey Producers' League ($12.00 affiliation fee returned by league.)	
No. 5—January 28, 1931—V. G. Milum, 3 months' salary	50.00
No. 6—April 8, 1931—V. G. Milum, expenses for attending House Appropriation's Committee hearing, April 1, 1931	8.27
No. 7—May 25, 1931—V. G. Milum, 3 months' salary	50.00
No. 8—September 2, 1931—V. G. Milum, 3 months' salary	50.00
No. 9—September 2, 1931—V. G. Milum, expenses to executive meeting, Springfield, August 19	13.70
No. 10—September 5, 1931—Elmer Kommer, expenses to executive meeting, Springfield, August 19	18.20
No. 11—September 5, 1931—C. A. Mackelden, expenses to executive meeting, Springfield, August 19	7.00
No. 12—October 1, 1931—Elmer Kommer, authorizing purchase of $100.00 post office money order, favor of Illinois State Beekeepers' Association.	
No. 13—October 5, 1931—V. G. Milum, 3 months' salary	50.00
Total expenditures to November 17, 1931	$293.34

RECAPITULATION.

Total receipts, November 18, 1930 to November 17, 1931	$484.94
Total expenditures, November 18, 1930 to November 17, 1931	293.34
Balance on hand November 17, 1931	$191.60
The above balance is covered by the following:	
On deposit in Cambridge Farmer's National Bank	$ 26.10
United States post office money order	100.00
Uncashed checks of V. G. Milum, $31.00 and $34.50, totaling	65.50
Total cash on hand	$191.60

(Signed) V. G. MILUM, *Secretary,*
Illinois State Beekeepers' Association.

November 18, 1931.

We, the Auditing Committee, have examined the records of the Secretary and the Treasurer of the Illinois State Beekeepers' Association and find them correct.

(Signed) S. A. TYLER,
EMORY WARNER,
Auditing Committee.

GENERAL REPORT OF THE SECRETARY FOR YEAR ENDING NOVEMBER 17, 1931.

Our membership during the past year has increased to 656 members who have paid their dues since the last convention, as compared to 488 in 1930, 527 in 1929 and 545 in 1928. This is partly explained by the organization of the following new associations: Ford County, LaSalle-Bureau, Morgan-Scott, and Stark Counties. Credit must be given to the reorganized Shelby County Association with 22 members and the Macon County Association with 50 members and to the McHenry-Lake County group with a total of 84 members, the latter impetus being due to the addition of Lake County to the McHenry Association in 1930.

On the other hand, associations showing a decided decrease in 1931 are as follows: Cook-DuPage, DeKalb, Franklin, Fulton, Jersey, Mercer, Northwest-Independent, and Piatt, while Kane County and Williamson County dropped out of the picture in 1929 and Whiteside in 1930. We hope that the severe 1931 relapses of Franklin and Mercer Counties are only temporary. Other associations have faltered for a year or so and then renewed their interest.

We had hopes of having an even 700 by this convention but let us all resolve to help boost the membership to that figure for 1932.

The final tabulation of membership by counties for the years 1928 to 1931 are shown in the accompanying table.

The Annual Report.

The question of the non-printing of the 1930 annual report has been fully explained in the Association Bulletin, yet we still receive complaints from members to the effect that they have not yet received it. A few seemed to be very much disgusted with us for not digging up a miraculous pitcher to pay the cost of the report. Since funds were not available it has been planned to combine the 1930 and 1931 reports into one volume to be sent to the publishers as soon after this convention as possible. In spite of our pleas to the inspector and local association secretaries only a small number of their 1931 reports have yet been received. We again urge that you insist that your officers provide this information.

Our State Appropriation.

At the last convention it was explained that the State Legislature was being asked to increase our annual appropriation from $2,400.00 to $3,000.00 in order to cover the increased costs and items of association expenditures. An estimate for this amount was presented to the

director of the budget but when the item was finally placed in the budget (House Bill No. 586—57th General Assembly) the amount had been reduced to the original allowance. Your secretary, on April 1st, was called to appear at a hearing of the House Appropriations Committee on this bill. After seeing and hearing the opposition to any increased expenditures for other agencies included in this bill, it seemed best to accept the original amount without stirring up any debate. While it is apparent that this amount is not sufficient for our needs, at least the next two annual reports can now be published if strict economy is practiced.

American Honey Producers' League.

At our 1929 convention, the association voted to affiliate with the American Honey Producers' League at an annual fee of $12.00 per year. This action was recommended by the secretary in his general report of last year, but no action was taken at that time other than the acceptance of the report and our association was not affiliated through lack of unity of agreement of the Executive Committee. Your secretary again recommends that we affiliate with the American Honey Producers' League for 1932 and delegate someone to represent our association (expenses unpaid) at the League Convention at Columbus on January 26-28, 1932.

Through the cooperation of the League and the American Honey Institute we were able to have supplies of honey recipes and other materials printed at much reduced costs. Samples of these were mailed to each association member and were used for distribution at the 1931 State Fair in the Apiary Exhibit and at the Culinary Exhibit in the Governor Emmerson Building. Likewise, copies of the American Honey Producer containing National Honey Week suggestions were mailed to each association member.

The American Honey Institute.

The mention of this name at once suggests to wide-awake, enthusiastic beekeepers the good work of this organization formerly headed by Dr. Barnard and assisted by Miss Fischer. While we all regret that Dr. Barnard has been called to other fields of work, we want the good work of the American Honey Institute to continue. The results of its work can not be measured in dollars and cents. It is accomplishing what huge advertisements costing tens and hundreds of thousands of dollars could not do by direct advertising. Of course, the pessimistic may argue that honey prices are low and there are no markets, but one must consider the times and the prices of other commodities.

On a chart on the wall are listed various contacts that the institute has made with Illinois people. A glance at the list will show 26 Illinois teachers of classes in foods; 17 Illinois dietitians contacted at the American Dietetic Convention; 25 Illinois home service directors of gas companies; 41 Home Economics women in Illinois business organizations; 26 Illinois bakers; 31 home service directors of Public Utility companies; 21 restauranteurs, 4 Home Economic editors of Illinois newspapers; besides a long list of others interested in foods in

various ways. We suggest that you consult this list for yourself. Perhaps it will suggest some sales opportunities.

On the desk here is a scrap book containing a lot of suggestions as to ways in which the institute contacts are helping the cause of the beekeepers. Look this over at your leisure. We wish also to call your attention to the clippings from the section of the Chicago Tribune for November 13, 1931, covering the Cooking School of the last few weeks. There are a number of points of interest in these clippings from the food section. Notice also the grocery ads and the almost complete absence of honey.

The question is, shall we continue our support of the American Honey Institute. In 1930 our State Association first contributed $25.00 which was supplemented by $27.00 by individuals. Perhaps there were others not reported to us. This does not include the $500.00 annual contributions of Dadant and Sons and $50.00 by the Phoenix Hermitic Company.

In 1931, the State Association did not contribute because of shortage of funds, but 7 local associations have reported $39.00, while 45 individuals contributed $128.75, with one of our association members adding $25.00 to the list, while 10 members gave $5.00 or more. Dadant & Sons have made their usual $500.00 gift.

What will we do in 1931? We suggest that our State Association pledge itself at least $5.00 per month for 1932, that all local associations help in 1932, and that every beekeeper do his bit toward the cause. A pledge blank on which you can sign your name, together with the amount and the date to be paid, is on the secretary's desk. Better still, we suggest that the president appoint a committee of two to circulate this pledge during the period of the convention to obtain as much support as possible to the American Honey Institute which must carry on. We cannot afford to drop the American Honey Institute.

The 1932 Progress Committees.

The secretary in the final preparation of this program, you will note, has included in the business session, a time for the appointment of 1932 progress committees. While the Executive Committee is supposed to transact all business between conventions it is your secretary's opinion that from year to year we often make little progress. It is our idea that these committees to be appointed by the 1932 president after election are to meet tomorrow noon during the lunch hour, discuss activities for 1932 and if deemed advisable make recommendations to the convention in the afternoon session for adoption or recommendation to the Executive Committee for the ensuing year. In fact, these committees, in some cases might very well serve in this capacity throughout the year and again make reports next year.

Possible committees that might be appointed are: Organization of County Association; Local Association Meeting Schedules; Cooperative Marketing; Uniform Labels and Containers; Legislation including Grading Regulations.

Illinois State Beekeepers' Association.

Statement of condition of State appropriation for 1929-1931 biennium, beginning July 1, 1929 and ending June 30, 1931.

For shorthand reporter and compiling reports	$400.00
Expenditures to September 30, 1931	384.97
Unexpended balance on hand September 30, 1931	$15.03
For publishing and distributing reports, expenses of State Fair Exhibit, etc.	$2,000.00

Expenditure Items.

Balance on 1928 annual report	$349.00	
Association bulletin	392.94	
Postage and express	112.43	
Telegrams	9.47	
Stationery	80.07	
Honey advertising literature	45.34	
1929 State Fair	11.40	
1930 State Fair	5.00	
1929 Annual tour	57.49	
1930 Annual tour	7.99	
1929 Convention	157.58	
1930 Convention	56.24	
Postage on 1929 annual report	60.55	
Printing of 1929 report	652.86	
Total expenditures to September 30, 1931		1,998.36
Unexpended balance on hand September 30, 1931		$1.64

Illinois State Beekeepers' Association.

Statement of condition of State appropriation for 1931-1933 biennium, beginning July 1, 1931 and ending June 30, 1933.

For shorthand reporter and compiling reports	$400.00
Expenditures to December 31, 1931	106.00
Balance on hand, December 31, 1931	$294.00
For publishing and distributing reports, expenses of State Fair Exhibit, etc.	$2,000.00

Items of Expenditure to December 31, 1931.

For bulletins	$91.76	
National Honey Week suggestions	20.45	
Envelopes for 1930-1931 report	10.72	
Stationery	21.34	
1931 State Fair	9.25	
Express on honey recipes for State Fair	1.31	
Badges for 1931 convention	9.15	
Expenses of speakers, 1931 convention	52.47	
Total expenditures to December 31, 1931		216.45
Balance on hand, December 31, 1931		$1,783.55

REGISTERED ATTENDANCE AT 41ST MEETING OF THE ILLINOIS STATE BEEKEEPERS' ASSOCIATION AT SPRINGFIELD, ILLINOIS, NOVEMBER 17-18, 1931.

Name.	Address.	County.	Number of colonies.	Comb or extracted honey.
R. E. Rankin	Payson	Adams	11	Both.
O. R. Matthew	Virginia	Cass	200	Both.
R. S. Marsh	Urbana	Champaign		
Joe Burdzilauskas	Pana	Christian	49	Both.
Joe Burdzilauskas, Jr	Pana	Christian	11	Both.
W. H. Stumm	Edinburg	Christian	48	Both.
W. H. Cowen	Oak Park	Cook	5	Both.
Mr. and Mrs. A. Bodenschatz	Lemont	Cook	170	Both.
A. G. Gill	Chicago	Cook	1	
E. A. Meineke	Arlington Heights	Cook	180	Both.
J. R. Wooldridge	Chicago	Cook	125	Both.
F. R. Belt	Canton	Fulton	48	
C. J. Anderson	Morris	Grundy	150	Extracted.
R. A. Grout	Hamilton	Hancock		
H. C. Dadant	Hamilton	Hancock		
E. F. Peterson	Kewanee	Henry	220	
Elmer Kommer	Woodhull	Henry	75	Both.
Edwin Kommer	Cambridge	Henry	125	Both.
R. J. Munson	Onarga	Iroquois	50	Both.
J. N. Koritz	Buckley	Iroquois	80	Both.
Woodrow Koritz	Buckley	Iroquois		
H. L. Dunn	Onarga	Iroquois	145	Both.
Roy Annear	Mulkeytown	Jackson	50	Extracted.
Elfie Annear	Mulkeytown	Jackson		
Nola Annear	Mulkeytown	Jackson		
Mr. and Mrs. H. A. Leur	Jerseyville	Jersey	125	Both.
Mr. and Mrs. C. A. Mackelden	Jerseyville	Jersey		
C. P. Jankowski	Gurnee	Lake	50	Extracted.
Fred F. Bellatti	Mt. Pulaski	Logan	50	Both.
Mr. and Mrs. S. A. Tyler	San Jose	Logan	200	Both.
I. C. Evans	Decatur	Macon	100	Both.
G. Murray Morris	Decatur	Macon	1	
A. R. Parish	Decatur	Macon	62	Both.
O. L. Stone	Decatur	Macon	7	Comb.
Mr. and Mrs. Edw. C. Heldt	Randolph	McLean	340	Both.
H. J. Bryan	Normal	McLean	19	Both.
Dow Ripley	Aledo	Mercer	35	Both.
W. W. Osborn	Hillsboro	Montgomery	5	
Laurence W. Fisher	Woodson	Morgan	60	Extracted.
J. H. McClure	Murrayville	Morgan	60	Extracted.
C. L. Sauer	Polo	Ogle	207	
S. S. Claussen	Oregon	Ogle	55	
Mr. and Mrs. B. F. Bell	Kingston Mines	Peoria	328	
Emory Warner	Monticello	Piatt	85	Both.
C. W. Brown	Monticello	Piatt	20	Both.
Mr. and Mrs. A. L. Kildow	Putnam	Putnam	225	Both.
Mr. and Mrs. S. F. Peterson	East Moline	Rock Island	30	Both.
Louie Vannis	Harrisburg	Saline		
Mike Zarasky	Springfield	Sangamon	10	Comb.
Jas. A. Stone	Farmingdale	Sangamon		
A. F. Soingler	Springfield	Sangamon		
Leone Michelangeli	Springfield	Sangamon	24	Extracted.
Olin Thompson	Springfield	Sangamon		
Louis E. Groth	Springfield	Sangamon	17	Extracted.
Harry L. King	Springfield	Sangamon	30	Extracted.
Philip Krebs	Marissa	St. Clair	200	Both.
John W. Klein	Freeburg	St. Clair	62	Both.
A. L. Holmes	Jacksonville	Scott	90	Both.
W. G. Duckwall	Jacksonville	Scott	70	Both.
W. H. Jackson	Toulon	Stark		
Mrs. Vera Winkler	Joliet	Will	500	Extracted.
Edward Winkler	Joliet	Will		
Wm. H. Voigt	Monee	Will	105	Both.
Alfred Thomas	Secor	Woodford	80	Extracted.
Benj. H. Fischer	Roanoke	Woodford	60	Extracted.
Wm. C. Wilson	St. Charles, Mo		120	Extracted.
V. G. Milum	Champaign-Urbana	U. of I	50	Both.
E. R. Root	Medina, Ohio		1,200	
Louie Vannis	Harrisburg	Saline		
E. M. Klein	Gurnee	Lake		

THE HONEY BEE.

Here's a little honey bee, my friends see,
Gathering sweetness for you and for me,
On Sir Dandelion's crown,
She is yellow that was brown;
Yellow with the golden dust
Lent to her in solemn trust.
Blossoms bartering gold for gold;
Through that dustier barrier bold,
Dandelion seeks a bride,
Sends his offerings far and wide
By his trusted friend the bee
And with honey pays the fee.

Notice those double pair of wings
And they are such perfect things,
Airships are as balkey snails
Where she spreads her gauzy sails;
While they are getting under way,
Miles she'll go and call it play.
Hairy legs are good for bees,
Therefore she has six of these;
She has baskets on her knees,
To carry bread for baby bees;
She has hooks on her toes,
Uses them to climb and knows
How to make a ladder where
Others need a boost or stair,
With these hooks bees hang like strings,
Clasping others legs or wings.

See her suck the honey up
From Dandelion's cup,
Could you see her hollow tongue,
You'd imagine she is young,
Sucking Lemo through a straw,
The finest drink you ever saw,
Yes, but hers is ready made
And beats any lemonade;
Sugar just to suit her taste,
It is strange she makes haste.
She'll go home and tell the rest
That she is Dandelion's guest,
That he fills the Golden cup
Everytime she drinks it up.
If you had a tongue like that,
Would you not throw up your hat?

Notice those two prongs in front,
They are put there so she won't
Bunt 'gainst her Ma some moonless night
When the stars are out of sight,
She just creeps along
Through the dark and midst the throng,
Creepers take the place of hands,
And when she runs against her dearest friends,
Reaches out as if to say,
"How do you do, Art thou well to-day?"
Some wise men seem to think that's her ears,
Feels the sound instead of hears.
These same wise men too say, that she smells
All the fragrant lily bells,
And the Clover fields that are in bloom
And the Linden's choicest perfume
Through those hornlike antennae
Useful aren't they to the bee?

But you say she has a sting,
And that isn't a pleasant thing;
Yes, but roses too have briars,
And too many fond desires
Have a stinger at the end.
We, too, sometimes sting a friend.
Stingers are for self-defense,
Against attacks of violence,
She like us sometimes will use it,
Never saying, "Please excuse it,"
And seldom fails to lose it.
Stingers, my friends, are all right
When they don't appear in sight.

THE OLD VERSUS THE NEW IN BEEKEEPING.*

(By E. R. Root, Medina, Ohio, Editor of Gleanings in Bee Culture.)

When I was along in the thirties I used to think that when I got to be forty I would be an old man indeed. How I dreaded the day. When I arrived at the age of forty I looked forward to fifty, then from fifty on to sixty, and now in my seventieth year I am not so old as I thought I would be and best of all I have a chance to look backward and see how the world has moved onward and upward. When I think of the fifty and sixty years of material progress of the telegraph, telephone, electric lights, radio, zeppelins, aeroplanes and the automobile, all of these and more make me wonder whether I, like Rip Van Winkle, am just awakening from a dream or whether I, in the flesh, have during these fifty and sixty years actually seen these things that are so wonderful to us today.

While the progress in beekeeping has not been so great, yet as I look back we are not keeping bees as we used to do. I recall the time when we talked about the pollen theory, how it was argued that if we could only get rid of the pollen we could winter our bees successfully. Then there was the sting trowel theory, the Dikel theory that was just about as silly and yet I remember how pages and pages of good space were wasted in our bee journals discussing these theories that had no practical relation to the real subject of wintering or of honey production.

Back in the early eighties on up through the nineties we were discussing contraction. We tried to make ourselves believe that intensive agriculture had driven out white clover and all other honey plants. Therefore, it was necessary for us to contract the brood nest down to four or five combs and thus squeeze what little honey did come in up into the supers. Fine in theory but poor in practice. I don't need to say how this theory of contraction ruined the chances of a crop of honey on the part of those who believed and practiced squeezing colonies down into small brood chambers. Even as good a beekeeper as R. L. Taylor, back in the early days, wondered why it was that he could not get a crop of honey. He forgot the fact that he and all other contractionists were squeezing their colonies down to such a small capacity that there were not bees enough to go into the field to get what honey there was to be secured. There were so few that they had to stay at home and nurse the brood. No wonder they got no surplus.

Fortunately, contraction gave way to strong powerful colonies, colonies measured by a two story Langstroth hive with queen breeding

* Presented at Annual Meeting of Illinois State Beekeepers' Association, Springfield, Illinois, November 17-18, 1931.

in both, or, colonies in Langstroth-Quinby hives with a half story added to give the bees capacity enough for breeding. This would give a force of workers large enough to secure the crop.

There is hardly a successful honey producer today who is producing a crop by the carload that depends upon small colonies. A colony really worthwhile should have 75,000 to 100,000 bees in it. Perhaps some right here will say, "How are you going to get colonies that will have the last named figure?" By having a large reserve of natural sealed stores and room enough so that a good queen can expand her brood into two stories of a Langstroth hive. Such a colony as that at the beginning of the harvest will have bees enough to do some real business in gathering a crop of honey. To get such colonies we need natural food, not sugar syrup.

And this brings me to the question of feeding bees sugar syrup. Back in the eighties there were all kinds of patented feeders. Everyone was talking about how to feed bees sugar syrup. Bees were fed late in the fall to make sure they had sufficient stores and which was correct enough in a way if the bees had no natural stores. They were fed again in the early spring and continuously fed until about the time of the honey crop. Sometimes this resulted in strong colonies and sometimes it did not. Feeding in the spring or fall puts an enormous strain upon the bees. If the weather is chilly the bees rush out and die. I know from some experiments that I have conducted that many thousands of bees are lost or killed outright on account of having to pass so much syrup through their organisms.

More and more it is getting to be the practice today to do away with feeding altogether and to adopt instead natural stores. The natural honey already in the combs is as cheap if not cheaper than sugar reduced to a syrup and stored and sealed in the combs. Syrup for breeding is not as good as a sealed honey.

We at Medina produce honey by the carload. We do not feed bees sugar syrup any more. That is a relic of old days. We have strong, powerful colonies, such as I have described and before the harvest is over we set aside a food chamber, either a half depth or a full depth Langstroth hive body. This is filled with good, natural stores and kept as a reserve. After the honey crop has been secured one of these food chambers is put on top of each of our colonies. This completes fall and spring management and except for packing we forget the bees until near harvest. We do not even examine the brood nest to see whether there is sufficient stores. One of these food chambers containing 50 pounds of honey will insure a good colony by next spring, other conditions being equal, such as proper housing and windbreaks.

In these latter days we are not putting so much stress upon packing, excessive packing, at least, but putting more stress upon proper windbreaks and moderate packing. In the old days we went to the extreme perhaps of putting on six, eight and ten inches of packing and now we are getting away from that and using less packing and in addition a suitable windbreak, in the form of shrubs or trees, or a board fence with the boards placed about an inch apart.

In the olden days we used to spend hours in a horse and wagon in going to outyards where now we spend minutes with an automobile truck. We have with good roads annihilated distance. We can go a hundred miles or more to a good locality and secure a crop of honey. The old way with a horse and wagon meant no surplus. The new horse run by gas means a surplus.

In the olden days we used to spend a great deal of time in looking over the colonies, hunting for the queen. We now requeen without dequeening. We do not spend much time with the individual colony, very little time in handling over the frames. But you ask, "What do you do about foul brood?" We leave that matter wholly to the inspectors, who are paid by the State to look over our combs, every inch of them. In short, we have cut down our labor to less than half of former days and are producing crops of honey in localities that in those olden days we thought were no good. The trouble then was not so much with localities, nor with the poor bees that were not given half a chance but with the management. With the new methods of management, powerful colonies and food chambers, we are able to produce a crop of honey now at half the former cost.

TREND OF AFFAIRS IN BEEKEEPING.*

(By GEO. S. DEMUTH, Editor Gleanings in Bee Culture.)

It would seem unnecessary to discuss the trend of affairs in beekeeping when, so far as appearances on the surface are concerned, most casual observers would say that the industry is drifting from bad to worse. Prices of honey have been drifting downward for several years and each season seems to bring greater difficulties in marketing the crop.

However, it is not always possible to tell in what direction a stream is running unless one goes up and down the stream for some little distance. Some of the things we see at the present time may be eddies and cross currents that give the wrong impression in regard to the direction of the stream.

When the first white settlers came to this continent they had a hard struggle to provide themselves with sufficient food to sustain life. The rich soil provided only enough food for a sparse population. Today a single county may produce more food than was available in what is now an entire state or province when the first white settlers cleared little patches of ground for their primitive agriculture. Early explorers to that portion of the Pacific Coast, which later became California, warned other explorers to stay away from that region unless they carried with them large supplies of food, describing it as a barren country. Today, thousands of carloads of food, produced in the rich, irrigated valleys of California, are being shipped every year to other parts of the country. In the early days, the great prairie region of Canada and the United States supplied only sufficient food for wandering herds of buffalo, while today the rich farms of those regions could supply bread for most of the world.

Forty years ago economists began to figure how many years it would be until the increase of population in the world would outrun its food supply on account of most of the available agricultural land in the West being put under cultivation. It was then predicted that the United States would soon be compelled to import wheat from other countries to supply sufficient bread for the nation. That important date seems more remote today than it did then. The magic of scientific agriculture and agricultural machines have banished famine from western civilization, and sufficient food for a much larger population of the world now seems to be assured.

In providing the other necessities of life (clothing and shelter) machinery has largely eliminated the tedious and laborious methods of another generation. In addition, the machine age has made it possible

* Paper presented at League Convention, Toronto, Canada, February 9-11, 1931. Reprinted from the American Honey Producer, 5:67-71, August, 1931.

for the great masses to have conveniences and luxuries beyond the reach of the wealthy fifty years ago. Mass production, keen competition, and declining prices, have compelled manufacturers to replace much human labor by machinery. This has taken place more rapidly during the past ten years than during any previous similar period. In the great automobile-tire factories, it is said that one man today does the work which required ten men ten years ago. This is typical of what has taken place in all kinds of factories during the decade. Thus, machinery, by greatly reducing production costs, is changing former luxuries to necessities, and inventive genius is creating new luxuries at an astonishing rate.

If an individual were compelled to provide his food, clothing, shelter and a few conveniences, making everything himself from raw materials, he would be compelled to work long hours and would have a meager living indeed. If one were to try to build a modern house from raw material without the help of others, taking the timber from the tree, mining the metal for the plumbing and heating, and putting it through the processes up to the finished article, making the glass, paint, bricks, mortars and all other material used, it would require years to build a house, even if the builder had access to all the modern tools. If one should attempt to build his automobile by obtaining the material from the mine, forest, and field, then take from the earth the crude oil from which the gasoline and lubricating oil necessary for running it are made, putting this through the refining process and transporting it to his house, he would need the proverbial nine lives of the cat in order to finish his machine in time to take his first ride in it.

The abundance of food, comforts, conveniences and luxuries we enjoy today are made possible by the complex industrial mechanism that has gradually been built up in the civilized portion of the world. In this great industrial machine, each individual unit depends upon all the others. Thus, the great mechanism which promises to banish poverty from civilized nations is extremely delicate in adjustment and can be easily upset, bringing about the industrial conditions which we have today. We are told that we have too much wheat, cotton, sugar, honey, beeswax, gasoline, and nearly all other commodities, yet many people are in want. Will Rogers has aptly said that we have so much of everything that we are starving. The great industrial mechanism by which poverty should be banished has ground out goods so fast that it has become choked with its own surpluses and must slow down until the surpluses are consumed. Possibly the present adjustment toward conditions by which it will be necessary to work only two or three days a week to have all the necessities, conveniences, luxuries, and in addition, time and means for a superstructure of culture.

Since the last serious readjustment of the industrial machine, about ten years ago, beekeeping has followed a course similar to that of other industries. The disturbance in the production and distribution of sugar during the latter part of the World War had brought about a great expansion in beekeeping. The change from comb honey production to extracted honey production, that got under way in the United States following the passage of the Pure Food Law in 1906, became a landslide when the price of extracted honey ranged from 20 to 30 cents per pound

at the close of the World War. Comb honey producers changed their equipment for extracted honey production, and expanded their operations by adding rapidly to the string of out-apiaries, thus, within a few years, increasing their production many fold. Later, as prices began to drop, these larger producers were compelled to meet lower prices by short cuts in production methods, so that today honey is being produced with an astonishing small amount of labor per colony or per pound. Commercial honey producers, confronted with lower prices, were quick to adopt modern mass production methods. Instead of decreasing their production, they were compelled to increase it in order to lower their costs per unit. Thus, instead of the somewhat localized and smaller-volume business of several years ago, it soon became necessary to export large quantities of honey from both the United States and Canada, which means that we are now competing in the world's market with prices adjusted accordingly. Mass production, together with the necessity of exporting honey, has rendered the beekeeping industry more vulnerable to business depression than ever before.

The larger producers who depend upon honey production alone, and who have not been able to lower their costs sufficiently, are suffering more from present marketing conditions. Some of these may be compelled to drop out unless they succeed in further lowering their costs of production. Many large producers in good locations have been able to adjust themselves to lower prices, but probably will not increase their number of apiaries until conditions improve. Owing to the peculiar nature of beekeeping and increasing local marketing, many smaller producers, especially in the East, are doing well. This is especially true where beekeeping is carried on as a part-time source of income. There is evident an increasing interest in beekeeping as a sideline. In the East, there is an increasing number of small beekeepers who produce a little honey, sell it to their neighbors, then buy honey from others to supply the demand they are thus creating. This is a development that should absorb increasing proportions of the crops produced by larger producers.

Honey is being given more publicity today than ever before. The American Honey Institute and other agencies are bringing about increasing recognition of honey as a valuable and healthful addition to the diet. Many large advertisers of food products have learned the value of mentioning honey in their advertisements since "honey" is a word to conjure with, and domestic science leaders are becoming more and more interested in honey.

Since beekeeping is becoming more and more commercialized, there is a better understanding of business principles among the more extensive producers. This is well illustrated in the definite trend toward a saner and more wholesome attitude of beekeepers toward cooperative marketing. They no longer expect the impossible from the management of cooperatives. Not many years ago, it was seriously thought that placing the honey produced by members of cooperatives into warehouses would raise the price. Some have even advocated compulsory cooperative selling of honey in order to withhold larger amounts of honey from the market when prices are low. We have learned that when competing in a world market, storing goods in a warehouse with the idea

of withholding it from the market until prices go up, often results in simply affording an opportunity for others to get rid of their surplus, and that the larger the amount held in storage, the greater the danger of still lower prices, the visible supply in storage constantly threatening the market. This is well illustrated in the recent attempt of the United States Farm Board to peg the price of wheat against the low of supply and demand by purchasing and storing on a declining market.

The disastrous results of various attempts of artificially holding up the price of various commodities during the past two years have brought back a realization that the old law of supply and demand is still in operation, and that to sustain prices the goods need to be consumed instead of stored in warehouses. The more wholesome and businesslike attitude on the part of beekeepers towards cooperatives makes for greater safety of these highly beneficient organizations which have proven their great value to producers during the recent trying times.

A remarkable trend of affairs in beekeeping is the great development in direct marketing of honey. The difficulties in marketing through the regular trade channels has compelled many to go direct to consumers. Honey is being transported long distances by truck and sold direct, in many cases. This is probably a temporary trend brought about by present conditions, but it has resulted in making a new outlet for honey that should be of great value in the future.

The trend in cutting costs of production through short cuts and the elimination of unnecessary labor (formerly thought to be necessary) continues strong. Apiaries are now being operated with surprisingly few visits during the year. A beekeeper establishes an out-apiary in some obscure corner on a farm, visits it a few times during the season to check over the colonies and add supers as necessary, then, at the close of the honey flow, hauls home a larger crop of honey than was formerly obtained by almost daily attention to the apiary. The automobile and increasing mileage of improved roads are making it possible for one man to take care of two or three times as many out-apiaries as was possible before.

In this connection, the food-chamber idea is still rapidly gaining ground since it is a large factor in the elimination of labor. During the past ten years, feeding bees has been all but eliminated. Even the feeding of sugar syrup for winter stores in the colder parts of the country, where winter cleansing flights are often not possible over a long period, is practiced less than formerly thought necessary, and may in time be almost entirely eliminated.

While beekeepers will continue to conduct experiments in improving their business, experimental and research work in beekeeping problems are being rapidly taken over by experienced investigators in government service and in agricultural colleges in both Canada and the United States. The data thus obtained and given to beekeepers is becoming a greater factor than we realize in preventing losses and increasing efficiency in the management of bees. Beekeepers are properly depending, more and more, upon these experienced research workers for the solution of some of their most difficult problems.

Swarming has become a minor factor compared with its former importance since the cause of swarming has been discovered, and methods worked out by which there is but little trouble from this source during normal seasons when producing extracted honey. There is some indication that artificial supersedure of queens may be brought about easily and cheaply at the proper time to prevent swarming entirely in the production of either comb honey or extracted honey and at the same time requeen the apiary.

The use of package bees by northern honey producers continues to increase with, of course, variation from season to season. The increasing demand for package bees has resulted in many breeders rushing into the business and the resultant keen competition, which in turn has brought about lower prices and greater efficiency in production on the part of some and the elimination of weaker producers. Prospects for a greatly increased demand of package bees for pollination purposes may further stimulate production.

In apiary inspection there is a definite trend toward burning diseased colonies. As the number of diseased colonies decreases through more effective inspection work this trend becomes more pronounced. At the same time, the idea of certification of honey is growing in some regions. So far as I know, the agitation for certification of honey originates in every case, from a desire to shut out honey from other states or nations instead of the elimination of disease. The agitation for certified honey has already brought about untold injury in the marketing of honey. The attempt to reduce competition through verified honey has become a most dangerous boomerang. Since it is now known from carefully conducted experiments that commercial honey produced by modern methods is not an important factor in the spread of American foul brood, it certainly seems high time that beekeepers cease slandering the fair name of their product.

In conclusion, the beekeeping industry in common with nearly all other industries, is going through a period of depression and readjustment. In many respects, it is much better off than most other industries. Since beekeeping has grown up and taken its place among other industries instead of being a localized affair, it must from now on pay the penalty for being a grown-up industry, during periods of depression. Its increased and more stable volume, together with the astonishing slashing of production costs have put the industry in a much better position than ever for profitable operation when conditions improve. The surface has scarcely been scratched in the vast potential market for our product. Marginal producers (chiefly in poor locations) are either moving to better locations or dropping out of the picture. Beekeeping on a large scale is being concentrated in rather definite producing areas, where higher yields cut down the cost per unit. At the same time, thousands of beekeepers in less desirable localities are operating snug little businesses of their own and helping to market the big fellows' crops. The relatively independent outdoor life, the extreme enthusiasm so characteristic of the real beekeeper, and the fact that, in most cases, we are better off where we are, will cause most of us to carry on through depression as well as prosperity.

No one knows what further great improvements may be in store for us just around the corner. Prophets in attempting to predict future events usually make the mistake of placing the time too far in the future. Bellamy's prophecy of the radio (1888) in "Looking Backward" sets the time for its advent 75 years too far in advance, but even worse, the radio of his prophecy was a short distance affair by which a sermon in a church a short distance away was heard in a home. Today, we hear sermons, lectures, and music from beyond the seas, an accomplishment far beyond the fertile imagination of Edward Bellamy. Jules Verne's prophecy of the submarine in "Twenty Thousand Leagues Under the Sea" (1870), was more than realized long before the time he set for it. H. G. Wells, in "Anticipations" (1901) set the time for the airplane in 1950, but almost before the ink was dry, the airplane arrived. Kipling, in "The Night Mail," described an imaginary air trip carrying mail across the Atlantic but set the date for the year 2000. Plans are being made now for mail service by air across the Atlantic in the near future and it is still a long time before the year 2000 will arrive.

We have abundant reasons for "carrying on."

AN INVENTORY OF OUR INDUSTRY.*

(M. G. DADANT, Hamilton, Illinois.)

No doubt you folks are no exception to the general rule of the population who have become embarrassed, harassed, and put to considerable strain by the difficult times which we have been experiencing and through which we all hope that we have come at least over half way.

No doubt but that the old saying that every cloud has a silver lining has much of a truth in it. No doubt but that times of difficulty make us put aside the petty things of life and make us see that, after all, the real measures of life's proper fulfillment have little to do with the amount of money a person has, or the luxuries and conveniences he may enjoy. And the realization of the true measures in life, after all, are the silver lining which may expand as we go on, and become the bright sunny day of tomorrow.

But I believe that even behind the clouds the beekeeping industry is in a peculiarly desirable place to see a bit of the silver which many other industries find hidden.

I have been much interested in a series of tables recently issued by the Bureau of Statistics at Washington, giving a comparison of prices of different farm commodities from 1914, which was pre-war, down to November first of this year. Through the good offices of Mr. Harold J. Clay of the department prices of honey have been included in the survey.

I am agreeably surprised to find that honey plays no mean role in the comparisons. We consider that wheat, the staff of life reached its highest point during the war when it sold at a price of $3.00, this being a controlled price set by the government. But in 1812 wheat reached its all time high of $3.84. I wonder to just what heights it would have risen during the World War if we had not had the restrictions. Undoubtedly a price of $5.00 would have been attained.

Now let us compare honey. No records for early years are obtainable but we do know that during the war, average prices of about 21 cents a pound were obtained. Comb honey went to $7.50 a case. And there was no control. In other words honey went as high as the consumer would pay, with no limits set by the government.

During the early 1931 fall low, wheat sank below 45 cents, or about one-seventh the price of its war time, restricted high. With no restrictions probably the ratio would have been less than a tenth of war time prices. On the other hand average prices for honey now are about 7 cents, just about one-third of the high time peak. In other words wheat is only a seventh of what it was in 1918 while honey is a third what it was. When we come to retail prices, they are even better pro-

* Paper presented at the Annual Meeting of the Wisconsin State Beekeepers' Association, Milwaukee, Wisconsin, December 4, 1931.

portioned. A ten pound pail sold then for $3.00 to $3.50. The same now is selling from $1.00 to $1.75. Even the big western producer has no great reason to complain, on a basis of comparisons, for amber honey at 3½ cents is just about on a level with what it was in 1914.

Naturally, this is pleasing to the honey producer who has honey to sell. If he has none, there is really no cure except perseverance. Prices will not help. No system yet devised will automatically bring rain from the clouds nor nectar from the plants. We should be a weak nation were we to wish for it.

But there are undoubtedly reasons why honey should be in such favorable position. In the first place it is a specialized industry, which is also not well known. When wheat goes high in price, every farmer raises wheat. The supply becomes great. The same is true of corn or potatoes. When honey goes up, every honey producer, does, of course try to raise more honey, but every farmer the country over does not get himself some bees. It is too specialized an industry. It takes some experience to make a success. Much more so than with the staple crops. When wheat drops way down, the reverse holds true. And millions of acres go into some other crop which the farmer thinks will pay him better. Soy beans have seen the same fluctuations during the past year.

Honey fluctuates but not nearly so rapidly as the grains and one reason for it is that it is a specialized vocation that a producer cannot rush in and out of in a year or two. A beekeeper makes honey producing his life work, and he also usually has some side lines to help tide him over the poor crops and difficult times.

But there must be other reasons for our comparatively good prices. We cannot lay it to exports, because our export market failed us just at the time when we needed it most. In 1927 we exported 12 million pounds of honey, while in 1930 our exports had shrunk to a little over three million pounds. Germany's heavy duties and excuses of diastase lack, cut her imports to a negligible quantity. We can find no reason in honey exports.

I think we ought to seek nearer home. And that is with the beekeepers themselves. We all know that a two pound per capita consumption of honey is nothing to what it should be. We ought to sell ten pounds if the per capita is over a hundred on sugar. Apparently the beekeepers began to see this at the same time that they saw honey prices falling. As a result the beekeeper was not satisfied to drop his crop into the general markets for what he could get, but decided to use his spare time to go after a local market for himself. One after another, western producers who had become carlot shippers, got off the general market, bought retail packages and made thorough canvass of their own territories, which had been neglected. The result was that in some of those territories, the per capita consumption instead of being less than a pound, rose rapidly, in some cases to ten pounds, and at fair prices for the beekeeper, at least better than he could have gotten on the open market. You have heard little complaint lately from our central western beekeepers of western honey being dumped into our small towns to ruin the market. The volume of honey is not in the west to do it, and if it did come in, these central markets have been already well supplied by the activities of our own beekeepers. The sad part is that when our

own crop runs out, we do not keep on with outside honey so as to keep our customers always honey-conscious.

No glutting of the general markets on honey like there has been in cabbage or apples where cabbages rotted in the fields and apples stayed on the trees because they would not pay for the picking and crating. Of course we have an advantage in that our product is not perishable. That helps.

And I do not minimize the influence of the western selling organizations. No doubt regardless of whether they are regarded as successful, they have tried to feed the honey into the markets in an orderly fashion. There has not been a tendency to plump a dozen cars into Chicago or Kansas City without knowing what it would bring in advance.

Then there is the American Honey Institute. Its influence cannot be measured. Contacts have been made with dieticians, food experts, and food departments in big industrial food concerns. The baking industry has been kept informed of the value of honey in pastries and breads. Demonstrations have been given before influential groups. In fact demands have come in so thickly for information, help, lectures, radio, etc., that there have not been finances to go 'round.

I cannot agree with the opinion of one of our educators who states that these contacts with the kitchen are all wrong. He argues that the place for honey is on the table and not in the kitchen. I maintain that it is any place that honey will fit into the diet, and suit the peculiarities of the housewife. At our house its place is on the table, and we use more than ten pounds per capita too. But a friend beekeeper came in the other day, who uses scarcely any honey on the table but uses much of it in canning, baking, and cooking. Do we want to overlook one market to the exclusion of the other? Surely not. We want everyone to have honey in the shape that it will suit his taste and his health.

And when one of the members of one of the largest honey producing and marketing organizations tells you that the manager is calling on members for every pound of amber honey they can spare, because the stock is running low owing to the demand from bakeries, it is convincing. This same organization in years past has always had difficulty in disposing of this grade of honey at a satisfactory price. Our own firm has just finished shipping a lot of honey to a baking firm at a price of 7½ cents delivered in Chicago. That price was satisfactory to us. We think it would be to any beekeeper and that he could afford to support the institute out of it.

But perhaps I have painted too rosy a picture of the honey market and the part that the beekeeper has played either directly or indirectly. We still have a long ways to go, or rather I should have said a long ways that we can go. None of us know as much about our product as we should. The whole industry doesn't know what it should about honey. You and I know that honey is much better in the diet than any other sweet. We think we know why. But when Mr. City Dweller has a stomach ache, he won't take our word for it that he should have eaten some honey instead of that rich sugar plum pudding, or honey on his grape fruit instead of dosing it with sugar.

And Mr. Athletic Coach won't take our word for it that his fatigued athletes need a little honey between halves, because it is assimilated immediately while sugar has to be inverted.

But these folks will take the word of the doctor, or medical advisor. They will believe the printed reports of investigations by authorized government and state departments. And the doctors will act on such reports also. What we need most of all is authoritative information that can be presented to the people through the agencies that they rely upon.

In a discussion with my own doctor recently he assured me after argument with him, that he now believed that honey had a place in the diet, that it would be fine for baby feeding instead of corn syrup. "But," said he, "what kind of honey am I going to recommend? clover, fall, buckwheat, or what?" I cannot afford to go hit or miss, and I cannot take your word that all honies are good just because the general properties of honey itself is good. I have to go on recommending the syrup until I have authority to back me up on what to use."

So there you are. We know it and we don't know it. Likely there is reason for the central Europeans preferring amber honey. It may be better than the light. But we must have authority before we press this point.

The future for beekeeping in this country looks rosy to me—if we as beekeepers make use of our opportunities to make it rosy. Never was there the possibility in my estimation for honey to attain the high rank it should have in the human diet. I think it, I don't know it, and I and you must know it before we can see all of the sun behind the silver lining. At least three State departments are working on honey now, rather than the practical problems of beekeeping. The government is also working. We should get results.

But we must keep them working. We must not be the industry which might be left out if curtailment is made. And we must support our own Honey Institute. Deplorable and unbelievable it is that there are not funds enough to let it function as it should.

In the beekeeping industry we need a little of the enthusiasm and cooperation of the modern luncheon club. You know in our home town we have a Kiwanis Club. Recently we needed money to carry our more unfortunate citizens through the rigors of the present winter. We are all wide apart in politics, in religion, in occupation. We are competitors and we all have a different idea of how such a fund should be administered. We have all seen the mistakes of previous years and criticized them. But when the Associated Charities asked us to raise funds, every man worked. Got right out and solicited his share of the city. And this old world is a pretty good place after all, not many people will turn down a good cause even though they may have some doubt as to whether all of the money will be administered exactly as they wish.

That's what we need to do a little of in this honey institute movement. Forget our petty quarrels. Have them on the side if we want to, but don't let them befog the issue.

We need to follow Theodore Roosevelt's motto: "A man owes a part of his life to the building up of the profession in which he is engaged."

HONEY, ITS NATURE AND CARE.*

(Dr. R. C. J. Meyer, Hillsdale, Illinois.)

Honey is the first and last word in natural sweets. It was given by the all wise Creator to the people of all nations, the rich and the poor alike. It is perhaps the most universal and cosmopolitan of foods. The Old and New Testament, the Koran, the sacred books of India, China, Egypt, and Persia, and the sages of other nations, in fact, peoples of all nations, and kindred of the earth speak of it in the highest praise.

Honey has been used the world over as a food and in medicine. Greek and Roman philosophers have attributed their long life to the daily use of honey.

In Palestine, the land of milk and honey, it was believed to strengthen the understanding, and the children are given their daily rations.

Homer, Ovid, and Virgil wrote immortal verse on honey, modern poets sing of honey.

The negro swain calls his gal "My honey," and the sentimentalist speaks of the "honey-moon." To this day when the newly weds take their first flight, it is spoken of as the honey-moon, until they settle down in their little hive called their home. Just why this is called the honey-moon has not been explained unless one or both of the participants are often stung, or the disposition of the bride is so sweet. So honey plays an important part in our lives, always has and always will.

Honey was here on earth when man arrived upon the scene, and no doubt was used by him as a food from the beginning of his existence. Man no doubt soon afterward discovered its medicinal value. The earliest prescriptions of record contain honey. Virgin honey was used in concoctions for the cure of constipation, while old honey was used in concoctions for the cure of diarrhea. Honey was used in expectorant mixtures, and given as soothing potion, and as a heart stimulant, and was mixed with beeswax for local applications for many ailments. Pills made with honey as an excepient are said to remain uninduratid no matter how long they may be kept.

What then is honey? What is its composition? The Encyclopedia Britannica defines honey as a sweet viscid liquid elaborated by honey-bees from nectar obtained by them from the nectaries of flowers and after transportation to the hive in the honey-sack ripened into honey and finally deposited into the cells of the combs prepared for this storage. The U. S. Department of Agriculture has defined honey for purposes of preventing adulterations in the following terms: honey is a nectar and saccharine exudation of plants, gathered, modified, and stored in the combs by honey-bees, is laevo-rotary, contains no more than 25

* Paper presented at the Annual Meeting of the Illinois State Beekeepers' Association, Springfield, Illinois, November 18, 1931.

per cent of water, not more than 0.25 per cent of ash, and not more than 8 per cent of sucrose, and pollen and minerals in small quantities.

Dry weather with cool nights and hot days is usually most favorable to the secretion of the nectar. Honey contains a large number of materials which have been detected by chemical means as well as others, which only appear from physiological experiments. An average analysis made by Brown of the U. S. Department of Agriculture from American honey is as follows:

Water	17.70%
Levulose	40.50
Dextrose	34.02
Cane Sugar (Sucrose)	1.90
Dextrose and Gums	1.51
Ash	.15

(A large number of inorganic compounds, doubtless varying greatly with honey from different plants and geographical sources.) These percentages still leave a considerable amount of material not accounted for in the usual chemical analysis. Other substances which have been found in honey but which cannot be determined quantitatively are various enzymes such as invertase produced in considerable quantities by honeybees and used in the transformation of sucrose in nectar into dextrose and levulose; diastase (amylase), catalase, invulase and other enzymes in certain honeys; aromatic bodies of doubtful character and origin which give the characteristic aroma to honey from various plants.

The recent work in nutrition has caused a search for vitamins in honey of various sources, and vitamins A, B, and C have been found but far more work is needed in this field.

Honey from lucern (alfalfa) is high in dextrose and forms crystals quickly after removal from the hive and comb. The firmness of the crystals formed in honey depends on the rapidity of granulation or crystallization since dextrose crystals are not definite and fixed in form. Dextrose forms a crystal with one molecule of water of crystallization, with the result that when honey granulates the water content of the solution of uncrystallized sugar is increased. As a result of this, fermentation of honey is more apt to occur in granulated honey than in liquid honey.

Honey also has certain interesting physical properties so far unexplained. For example, if a solution of honey and water in equal parts is made and subjected to extremely low temperatures the solution does not freeze solid as a similar sugar solution would do, but forms a mushy mass. This is the explanation of the use of honey and water as an antifreezing solution for automobile radiators. The use of honey in this way furnishes an outlet for surplus honey.

Honey is said to be slightly acid in reaction, dissolves readily in water, less so in alcohol. Virgin honey is an ancient designation applied to honey from combs that have never contained brood, or that which flows spontaneously from the comb with or without the application of heat and is said to be laxative in effect.

Honey seems to have the power to destroy the lower forms of life such as the bacillus of typhoid, and bacillus *coli communis* and has the power of correcting the intestinal flora.

*Honey has the same caloric value as cane sugar "100" and is therefore a much better food than cane sugar because of its partial conversion and its other properties. It can be used by diabetic patients when cane sugar can not. Its medicinal values are not fully understood. It is more readily absorbed by the blood than cane sugar or glucose.

Mixed with water, honey has the stimulating effect much like alcohol but without the intoxicating effect and should be preferred. Mixed with fruit juices, it makes a delicious and healthful drink. Honey should be preferred by everyone using sweets, and should be on every table on Thanksgiving and Christmas if not at all times.

The care of honey begins in the preparation of the supers. Either for comb or extracted honey we must see that the supers are in perfect condition, that the cover fits properly and excludes all moisture. It must be in a clean condition, dry and free from odor, as honey absorbs both water and gases. It is also important to have your foundation wax perfectly placed so that the bees can build the comb symmetrically with about the same amount of honey on each side of the foundation wax.

For comb honey, keep the comb and sections as clean as possible. It is best to not leave the supers on after they are filled, to prevent the bees from sticking the combs and sections with propolis and wax that must be cleaned off to make the comb presentable for market as the sale of honey is enhanced or affected by its appearance.

In extracting honey it is all important that the separator, tanks, utensils, and everything that comes in contact with the honey must be clean and dry. Carelessness in this will affect or ruin the sale of the honey. After all utensils are thoroughly washed they must also be thoroughly dried, or the honey may not keep, since water and moisture contain germs and as the yeast plant is always present honey may turn soon, ferment and spoil. So it pays to keep everything that touches the honey clean and dry.

Honey should be kept in a dry place and free from noxious odors as honey will absorb both. In heating honey use double-boiler or place slats over wired foundation in common boiler. To place it into containers, care should be taken not to raise the temperature too high, say above 140 Fahrenheit, as too high a temperature will drive off the volatile oils to which the aroma of the honey is due, and thus spoil the flavor of the honey. Honey that has not been thoroughly ripened in the hive, may be further ripened by heating, thus driving off some of the moisture, but this will also drive off some of the volatile substances and thus lower the value of the honey so care must be used in this process to not use too high a temperature or too long an application of heat.

The honey we sell will reflect our care and attention in its preparation for market and should be in such a condition that we are not ashamed to put our name and address upon it.

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* Usually given as 1,485 calories as compared to 1,600 for cane sugar.

THE PRESENT STATUS OF HONEY INVESTIGATIONS.*

(E. F. PHILLIPS, Cornell University, Ithaca, New York.)

There is an enormous literature on honey which is of inestimable value, but unfortunately only a scant portion of this information has been made available to beekeepers and honey packers on this side of the ocean. To undertake an adequate discussion of this work assumes more or less familiarity with all of it, and on this basis there is probably no person qualified for the task. If future work is to be conducted along the most profitable and practical lines, it is desirable that we take stock of the accomplishments up to the present, but to do this thoroughly is a large task, and the present effort is only a sketch of the work.

The literature on honey may be classified into the scientific and the practical, a distinction which is more real than apparent, and there should be no such distinction. The scientific literature may roughly be classed into the three interlocking groups: (1) chemical, (2) biological, and (3) physical. There is of course an enormous literature based on the experiences of beekeepers and packers, for in all the years during which honey has been prepared for sale and put to use, those engaged in such work have discussed their experiences. Unfortunately, while certain practical conclusions have been reached, if the discussions in the beekeeping literature are studied carefully, it is found that perhaps the majority of the statements there made about honey either need qualification or they are quite incorrect. It is regrettable that ostensibly scientific literature has added to or perpetuated such errors. There is also a considerable literature on the uses of honey in cookery, baking and beverage manufacture. This may with profit be omitted in the present discussion, chiefly because the outstanding characteristic of this literature is its disregard of the carefully conducted scientific work which is now recorded.

The early work on honey gave special attention to chemical analyses dealing chiefly with the carbohydrates, and there is an extensive literature which gives a comprehensive knowledge of the relative proportions and variations of these compounds. Since detection of sophistication is always a vital problem, many tests have been devised for such use, the early ones being based chiefly on changes occurring in the sugars. There is also considerable literature on the composition of honey-dew honeys, coming from those European countries where this is an important part of the crop. Frl. Beutler's study on nectar sugars is helpful in understanding the sugars of honey. The discovery of melezitose in honey-dew honey by Hudson and more recently by Nottbohm and by Burnside and

* Paper presented at Annual Meeting of American Honey Producers' League, Toronto, Canada, February 11, 1931.

the finding of maltose as a common minor ingredient by Elser are further contributions, in which class might also be included the earlier discovery of the sugar alcohols, mannite and dulcite, in honey-dews.

Chemical methods have been refined to include microchemical studies of the mineral constituents by Elser and others. Still more recently studies have been made of constituents which occur in honeys in most minute amounts, in which group may be included work on the organic acids of honey which has helped to clear up the confusion arising from the routine practice of many chemists in measuring the acidity of honeys in terms of formic acid. This custom seems to have been based on the amusing assumption that this acid is injected into honey by the sting of the worker bee, a theory which was carried to its most absurd length in the "sting-trowel" theory of Clarke. The effect of tannic acid on iron in causing discoloration of tinned honeys is a practical application of work on honey acids. The recent crystallization by Nelson of the flavoring material of orange honey is a notable advance. Work on the nature of the coloring materials of honey, largely unpublished is another refinement in chemical work. There is also a large literature on supposedly poisonous honeys, running back for years, characterized mainly by lack of accuracy. On the whole the chemical work is excellent.

Among biological studies, most attention has recently been given to the enzyme content of honeys. The German work was stimulated by the necessity of finding some test to differentiate genuine honey from spurious syrups sold during and after the war as honey. Having found that honey contains diastase while artificial honey does not, it was natural that emphasis should be placed on this discovery by German beekeepers who were faced with a poor market. It is to be regretted that these tests were misused as a means of keeping genuine American honeys out of the German market, and while the present German tariff on honey seems excessive, it is more commendable to impose a prohibitive duty than to misdirect scientific tests to prevent competition. Apparently American honeys are often strained better than are some German honeys, so that their diastase content is lowered. Pollen grains are probably the chief source of this enzyme in honey, and their removal merely makes honey better. The unreliability of the supposedly quantitative tests for diastase in detecting the purity of honey has been shown by Freeborn and Vansell and by others.

Similar studies, free of commercial complications, have been made of other enzymes in honey. Gillette's unpublished work on catalase is in this class. There is still some confusion as to the sources of the various enzymes. While these mysterious substances are useful as trade marks of purity, the importance of their presence still remains to be demonstrated, and they are of doubtful importance for human food.

Several tests have been made for the presence of various vitamins in honeys. The more recent and more accurate work indicates that if vitamins are present, they are in scant amounts, perhaps derived again from included pollen grains. While beekeepers might welcome the opportunity to advertise honey as a vitamin source, a failure to find them does not detract from the merits of honey as human food. The study of precipitins of honey by several investigators is another biological study

of some interest which has attracted little attention and which has not been put to practical use. Investigations of pollen inclusions has been made by several workers, primarily for the purpose of fixing the floral source of honeys, although for this purpose the work appears to be virtually valueless. Studies of other solid inclusions, mostly organic, have also been made.

Honey fermentation is also a biological problem. The expansion of commercial honey production has necessitated the storage of honey from one year to the next, and the problem of honey fermentation has assumed large proportions. This is especially true on the American continent and is far less true in Europe, the difference lying in the differences which exist in the extent and scope of the beekeeping industry. Fermentation of honey is then a problem which arises from the very size of our honey industry. Most honey buyers examine every can of honey bought after about March 1 of the year following production to avoid the purchase of honey in which fermentation has already begun, but this is no protection to them against later fermentation if the honey is held for some time. Pugh's unpublished work on Ontario honeys indicates that honeys stored for one year show an average loss from fermentation of 5 per cent, while those stored for two years show an increase in tendency to ferment up to 25 per cent. Such losses are intolerable, and it is not surprising that several workers have independently attacked this problem. Much of the work so far done deals with the taxonomy of the sugar-tolerant yeasts causing honey fermentation. While it is a distinct advantage to know the kinds of yeasts which cause this trouble, their identification is only a preliminary step toward the real solution of the problem, which is to destroy these yeasts or so to inhibit their growth that they will not cause loss to the owner of the honey. Since it has been shown that these yeasts may enter honey through the nectar, evidently honey fermentation is an ever present problem to the honey owner which does not depend solely on his care at any step of production. It appears that a proper solution of the fermentation problem rests on some method of handling all honeys which are to be held for a time, so as to prevent losses, and the danger exists for all honeys and not merely for some with special characteristics.

Thin honeys ferment more readily than do well ripened honeys in the early stages after extraction. This fact had led to the assumption that the probability of later fermentation for any given honey may be predicted by a determination of the density of the honey in terms of specific gravity. This method has not only proven valueless but has been an actual detriment, for it has given false hopes where none actually existed and has caused losses which might have been avoided. Pugh found no relationship between specific gravity and fermentation in the honeys examined for a two year period in the records of the Ontario Honey Producers' Cooperative, if we disregard any honeys that were too thin to put on the market. Neither did he detect any correlation between fermentation in these honeys and floral source, color grades or climatic conditions at the time of production. If he had been able to include a larger area or a larger scope of honeys, it might be expected that honeys produced under conditions of considerable greater dryness might have

shown less fermentation, but it would be a false lead to assume too much in this regard, for it is known that dense western honeys sometimes ferment. Apparently specific gravity and density have little if any effect on this problem.

The relation of crystallization of honey to fermentation has complicated a proper consideration of this problem. The formation of dextrose hydrate crystals in honey causes an increased moisture content in the liquid phase of granulated honey. The water of crystallization in these crystals amounts to 9.09 per cent by weight of the material actually in crystal form. The original honey had a higher moisture content, and the removal of the dextrose from solution serves to bring the water content of the liquid portion to a figure higher than that of the original honey as a whole. This difference is of course not due to the "giving off" of water by the crystals, as has recently been suggested.

There seems also to be a general misconception as to the amount of any honey which actually becomes crystalline. Even in a honey which we commonly describe as solidly granulated, the amount of dextrose hydrate actually in crystal form is small in comparison with the total mass of the honey. It would probably be a rare instance in which 15 per cent of the total honey kept at ordinary temperatures has actually formed crystals. But the crystals that are formed serve as a supporting structure for the portion of the honey which remains in liquid form, giving an appearance of solidity. We then have in all granulated honeys a small solid phase and a far greater liquid phase. It must by no means be understood that the liquid phase here discussed is in the form of a layer of liquid honey at the top of the vessel, for the liquid phase of granulated honey is found throughout the honey, even in those cases where coarse, hard crystals are found in the bottom of jars of honey.

While it has for some time been realized that a relationship exists between granulation and fermentation, in some instances the facts have been badly misstated as to cause confusion. After fermentation has progressed for a time, it sometimes and perhaps usually happens that a partial separation of the solid and liquid phases of the honey takes place, apparently due to the presence of fermentation products. It has been stated that fermentation occurs after such a separation, whereas it commonly begins in solidly granulated honey. When one finds a honey which has not been heated and which has separated in the jar, it is usually safe to assume that fermentation has progressed far enough to make the honey unsuitable for market, and this is a stage too late to prevent the trouble. Such a separation occurs most commonly in honeys which have been heated somewhat during extraction.

Emphasis has also been placed on the supposed higher water content of the honey near the tops of containers, it being assumed that this supposedly high water content favors fermentation. This difference is apparently due either to the separation which occurs when liquid honeys of different densities are placed together without thorough blending or to already existing products of fermentation. Sometimes if several honeys of different densities are placed together and not well blended, fermentation may begin near the top of the vessel, but since the yeasts causing fermentation do not require oxygen from the air for their de-

velopment, if conditions are right, fermentation may begin and progress in any part of a honey vessel.

Fermentation is not common so long as a honey remains in liquid condition and occurs practically never in honeys which have been liquified by the methods used in bottling honeys, unless the honey is later carelessly exposed to moist air for a time and is at the same time contaminated with the sugar-tolerant yeasts. The effect of sugar concentrations in protecting yeasts from destruction by heat has been shown by Rahn, and these facts must be considered in determining proper temperatures for this purpose. It appears to be wholly useless to test the thermal death point of these yeasts in culture. It is then in tin containers that fermentation commonly occurs, for such honeys usually granulate after being prepared for the market.

The heating of honey is so simple a method of preventing fermentation that it might be concluded that the only precaution necessary would be to heat honey at the time it is put into containers. The destruction of enzymes due to such heating has been discussed, but as the value of these enzymes is probably insignificant, this need not be considered, at least for the domestic trade. This is by no means the most serious objection to the heating of honey. When honey is heated, the innumerable microscopic crystals which almost all natural honey contains when extracted are liquified, so that the honey granulates less rapidly after heating. When crystals finally form, they are coarse, imparting to the honey an inferior flavor. The true honey flavor is neither reduced nor destroyed unless the heating is excessive, since it is fully recoverable, but honey buyers appear to be unfamiliar with some of the most common facts about honey and persist in tasting honeys as they are received in the exact physical state in which they come. They erroneously assume that they can judge a honey by taste, regardless of its physical condition, but anybody who knows honey is aware that such testing methods are indefensible. The buyers refuse to pay full market price for a honey which has coarse granulation due to heating. Beekeepers of the New York and Pennsylvania buckwheat region every year have prices cut on some of their best buckwheat honey merely because it is coarsely granulated. So long as honey is sold in granulated form without further treatment, it is unsafe for the beekeeper to heat his honey to reduce losses from fermentation.

These and similar obstacles have led to the suggestion of the use of preservatives to be added to honeys. If there were no way to prevent fermentation other than to add a chemical preservative, we might consider it favorably, even though the idea is not attractive to beekeepers who have so earnestly and ardently fought food adulterations. Fortunately there is a better and more practical way. The suggestion has also been repeatedly made that honey should be kept in cold storage to prevent fermentation. To be compelled to use cold storage for honey preservation would so increase expenses that it would destroy all profits from the beekeeper's operations under present price conditions. Furthermore while it might be feasible to keep honey in cold storage so long as it is owned by either the beekeeper or the packer, there comes a time when the honey must go to the shelves of the grocer on its way to the

consumer, and here special temperature control becomes impossible, so that cold storage is an exceedingly poor method to use. As a practical piece of advice, the recommendation to use cold storage is extremely unfortunate, because it causes beekeepers to think that some progress has actually been made from the investigations on fermentation. There is one practical way, and so far one only, of preventing fermentation. This is to apply heat properly to destroy the yeasts, this to be followed by a proper handling of the honey so as not only to conserve its quality but actually to make it a better honey than it was in liquid form. Fortunately this is now reasonably possible, as was explained by Mr. Dyce in his paper yesterday.

A discussion of physical work on honey must deal chiefly with deficiencies. There are some interesting papers on physical properties of honey, mostly concerned with phenomena in which waves of radiant energy are involved, and some of this work has been useful in devising color standards for extracted honey. Unfortunately essential parts of this work are unpublished.

It is deeply regrettable that there are no thorough studies of viscosity, surface tension, crystallization phenomena, electrical charge of honey colloids, diffusion, relations of specific gravity to other physical phenomena and the like. There are two small papers on viscosity, neither of which give us much help, but they are a start in the right direction. Honey at ordinary temperatures is essentially a solution of sugars, partly supersaturated and containing also a considerable number of other important constituents in small amounts which markedly affect its physical characteristics. Jackson and Silsbee have recorded important facts on the effect of one honey sugar on the saturation point of another in a water solution, but leave out of account the other constituents of honey.

It so happens, whether or not this is desirable, that the physical condition of a honey is more important from the standpoint of marketing than the chemical composition. The physical state has a marked effect on the flavor of honey, and it is important to attain for our honeys that physical condition which will enhance the flavors. It then seems vitally important that more thorough studies be made of the physics of honey, primarily as a basis for practice. Recent work has vastly magnified the importance of such work, and points the way to greater progress in the future.

To illustrate this need, it is a serious problem in packing honey to prevent the formation of crystals in bottled honey. Methods have been devised to prevent crystal formation for months and in some blends for years, but all too often the honey is ruined as a first-class product by the excessive heating to which it is subjected. A study of the conditions of crystal formation in honeys shows that it is as easy to retard subsequent growth of crystals by safe as by improper heating, yet a lack of suitable studies has led to the unfortunate practices of the honey trade whereby much bottled honey is rendered inferior.

As a rule, a honey that has once been heated will crystallize in time, but with coarse, rough crystals. The reason for this difference, which is an exceedingly simple one, has not been known to packers. Since

heating of honey has been a common practice and since later granulation is of a highly undesirable type, the easiest way to put honey on the market has been in liquid form. This selection of the path of least resistence is probably responsible for the fact that the public prefers liquid honey to granulated, a situation which does not exist in other countries where more honey per capita is consumed.

Any unprejudiced judge of honey knows that the same honey in liquid, finely granulated and coarsely granulated form carries different flavors for each condition. The reasons for these differences lie partly in the physiology of taste and partly in our psychology, and the student of honey does not concern himself with these problems. It is necessary only to know that a finely granulated honey is unquestionably the best of the three. But since by ordinary methods of handling, this condition has not been readily attainable, packers have been satisfied to supply the market with less desirable liquid honey.

These statements are adequate to indicate that one of the things most needed is accurate information and suitable methods to control the physical condition of honey. The immediate economic value of such studies is indicated by the work reported earlier in this meeting by Mr. Dyce. It has been found to be a simple matter to control crystal formation, once the theory is understood, and this has been done not by the devising of entirely new methods but by the application to honey of methods long ago worked out for the crystallization of other products. Since by this process, fermentation is entirely controlled, the method assumes a double importance.

The materials which go to make up honey are in liquid, solid and colloidal states. The liquids are rather well known and the solids have been studied considerably. The striking Tyndall effect when light passes through honey indicates that there is a considerable colloidal content, but the nature of these colloids remains undetermined, although obviously some or all of them are dextrins. Since honey dextrins are not utilized by adult bees as food, these have a double interest.

The clarifying of honey is one of the most difficult problems of the honey packer, but the clarification at which he at present aims is merely the removal of larger solid particles and minute air bubbles. Since it is ordinarily so difficult to remove these, it may seem foolish to suggest the removal of the ultramicroscopic colloids, yet this is by no means impossible. The recent work of Lathrop and Paine is a start in this direction, and other unpublished work gives promise of practical methods.

Extracted honey in glass sells more on appearance than on quality, which is perhaps to be regretted but the fact remains. The removal of all larger particles and all or most of the colloids would greatly enhance the appearance of liquid honey without reducing its merit, and if the colloids are removed, the larger particles and bubbles also disappear. Before prophesying commercial success, many methods must be tried on a large scale. It is to be noted that other industries have been faced with similar problems which have been solved, so there are no inherent impossibilities in this effort. Beekeeping has to a large degree failed to take advantage of methods worked out by other industries, and our first task here is to look about for suggestions.

The first step in improving honey markets does not lie in boosting the merits of honey by advertising schemes, but in the making of honey as fine a food as possible, avoiding all methods which make honey less desirable or which materially increase handling costs. Since at present honey is usually injured by the methods employed, it is timely to suggest studies which will eliminate the bad practices and which will give a better product. Since the physical state of honey affects its flavor in a remarkable degree, and since physical condition is so important in honey sales, honey physics should be the leading problem for a time. While beekeepers themselves do many things to honey which make it less desirable, honey packers are the greatest culprits, for these men are impressed with the necessity of doing things in a big way which from their very nature injure honeys. Of recent months a most wholesome interest on the part of packers in improving their methods has been evident, so there is real hope for the betterment of this branch of honey handling.

A study of the physical characteristics of honey requires specialized methods, perhaps more complicated than those necessary for a study of honey chemistry. We are dealing with a highly complex mixture of compounds, in liquid, solid and colloidal states, each having its effect on the physical phenomena of honey as a whole. The problems suggested are not simple ones and it will lead only to confusion if untrained men undertake them. Whenever a new line of work is suggested, there are some who always rush into them blindly, with resulting confusion in the literature. The problems suggested appear to promise so much improvement that they are of real importance to beekeeping, but slap-dash methods will not bring advancement.

An outstanding difficulty in beekeeping work is that the investigator finds himself constantly confronted with new lines of scientific work which demand attack. Usually trained along some line of biological work, he is assumed to know how to do scientific work in chemistry, physics or biology, and some even have the timerity to attack economic problems. This is the greatest weakness in agricultural investigations and all that can be done is to make the best of a most difficult situation and get what help is possible.

HONEY RESEARCH AT HOME AND ABROAD.

(By C. A. Browne, Bureau of Chemistry and Soils, U. S. Department of Agriculture, Washington, D. C.)

I am very glad to have this opportunity of speaking to you today upon the subject of "Honey Research at Home and Abroad," in the treatment of which I must limit myself to only a few phases that have recently engaged my attention.

My interest in the chemistry of honey was first aroused in 1906 when I was in charge of the sugar laboratory of the Bureau of Chemistry. Dr. E. F. Phillips, whose stimulating influence upon honey research is felt in all parts of the world, was then director of the beekeeping work of the Department of Agriculture in Washington, and he called my attention one day to the importance of knowing more about the chemical composition of the various types of honey produced by bees from the different varieties of floral nectar. My eagerness to undertake such an investigation having been aroused, Dr. Phillips thereupon very kindly supplied me with about 100 samples of genuine American honeys of different types. The chemical examination of these honeys formed the substance of Bulletin 110 of the Bureau of Chemistry, now out of print and in many respects obsolete, for since this bulletin was published in 1908 we have gained more new knowledge about the chemical composition of honey than was acquired in all previous time.

One of the most fascinating features of honey research is its variety of interest. Unlike the products of human manufacture honey is not a rigidly standardized commodity. The various floral nectars from which our honeys are derived, although fundamentally alike in consisting of a solution of the sugars dextrose and levulose in water, differ greatly in the kinds and amounts of their mineral constituents, organic acids, essential oils, colloids, enzymes, tannins, nitrogenous bodies and other minor ingredients so that each type of honey has its own peculiar individuality and constitutes a separate distinct problem of research.

You are all familiar with the fact that honeys from various districts differ greatly in color, aroma, flavor and other physical characters. Certain types, such as clover and alfalfa honeys, granulate readily to a solid mass of dextrose crystals, whereas other types, such as tupelo and the honey dew honeys, have a tendency to remain always liquid. In tupelo honey this liquid characteristic is due to a preponderance in the floral nectar of the sugar levulose, which does not crystallize easily. In the honey dew honeys the liquid property results from the presence of a greater amount of certain gummy colloidal ingredients, gathered by

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bees from plant exudations other than floral nectar, which generally retard crystallization. Every honey contains a certain amount of these colloids, and it is only within the last few years that we have begun to realize the significance of this exceedingly important group of substances in honey research.

The transparent exudations known as gums which form upon the wounded bark of the cherry, peach, plum and other trees are similar in some of their properties to the colloidal ingredients of honey, but these are not gathered by bees, and they show important chemical differences from the gums occurring in honey. The bark gums for example are very rich in pentosans, which are almost completely lacking in the honey dew gathered by bees. Another important class of gum-like secretions are formed upon the leaves of trees and of certain plants, such as the sugar cane, when they are punctured by aphids, mealy bugs, leaf-hoppers and other insects. The sugar-containing plant juice, exuding from these punctures, becomes infected by bacteria which convert a part of the sugar into a mucilagenous substance known as dextrin. The residue of plant juices, modified by the activities of insects and bacteria and consisting of a complex mixture of sugars, gums, mineral constituents, organic acids and other substances, is the chief source of the honey dew which is gathered by bees in varying quantities, more when floral nectar is deficient, less when the nectar is plentiful. It is this honey dew that after its modification by the bee supplies most of the colloids of honey.

The colloids, as they exist in honey, consist of very minute suspended particles which do not enter into solution in the same way as the sugars, salts of the organic acids and other crystallizable constituents of honey. When honey is diluted with water and poured through filter paper the largest insoluble ingredients, such as pollen grains, are retained upon the filter. The suspended colloid particles, however, are so small that they readily pass through the pores of the paper and, therefore, cannot be removed in this way. If we take, however, a filtering surface with much finer pores, a so-called ultra filter, such as a collodion membrane, we can remove the colloidal particles of largest size.

It is by this means that Mr. Paine and his coworkers of the Carbohydrate Division of the Bureau of Chemistry and Soils have isolated the colloids from numerous types of honey for the purpose of studying their physical and chemical properties. It was found that a considerable part of the objectionable constituents which injure the market value of some honeys belong to these colloids and that when the latter are removed by filtration the resultant honey is improved in color, brilliancy, flavor and other characteristics. The cooking quality of the honey, by which we mean its ability to withstand the discoloring and caramelizing action of high temperature, is also greatly improved by removing the colloids and this is of great importance when honey is employed for cooking or for making candy. The percentages of the colloidal impurities removed by collodion filtration were found to range from less than 0.1 per cent for the lightest colored orange honeys to about 0.9 per cent for the dark colored buckwheat honeys. In the honey dew honeys the quantity of these objectionable colloids is very much higher.

Each suspended colloidal particle carries an electric charge, which in honeys is usually positive. If we mix with honey a colloidal substance with an opposite electric charge, such as the clay-like material known as bentonite, the negatively charged particles of the latter will attract and hold the positively charged particles of the honey colloids. The latter become, as we say, absorbed by the bentonite after which they can be readily removed by the ordinary filters of cloth or paper. This is a much more practical method of reducing the colloids of honey than is the method of ultrafiltration with a collodion membrane, which is a slow, tedious operation.

In order to secure the best results the honey should be diluted with water before being mixed with the bentonite; after being treated with bentonite and filtered the clarified honey sirup must be concentrated again in order to obtain a product of the proper density to withstand fermentation. This concentration is best effected at a low temperature under a partial vacuum so as to prevent discoloration of the honey by overheating. Some of the volatile aromatic constituents of honey are lost in the process, but this is not objectionable with the strong scented honeys, such as buckwheat, which are improved in flavor by this treatment. The possibility of modifying this procedure, so as to avoid the dilution and subsequent evaporation of the honey, is now being investigated at our Bureau in Washington, in order that the method can be applied on a profitable commercial scale to the improvement of some of our lower grade American honeys. What appears to be an interesting characteristic of such clarified honey is its tendency to remain liquid and the cause of this phenomenon, together with other phases of the general subject of honey colloids, is now engaging the attention of our chemists. The brilliancy of these samples of clarified alfalfa, buckwheat and tupelo honeys, which I have brought with me, as compared with that of the untreated honeys is an evidence of what may be accomplished towards improving the marketability of the products of our hives.

Another class of honey ingredients attracting the attention of the chemists of our bureau is the organic acids to which the pleasant tartness, which is one of the characteristics of all fine tasting honeys, is due. Information as to the nature of the various organic acids in our American honeys has been almost completely lacking, although the presence of formic, lactic, malic, tartaric, oxalic, succinic and other acids has been reported in European honeys by foreign investigators. The methods of analyses employed in some of these cases were not, however, wholly reliable, and a certain doubt has arisen as to the accuracy of the results. A study of the organic acids of fifteen different samples of American honey was accordingly undertaken by E. K. Nelson and H. H. Mottern of the Food Research Division of our bureau. The volatile acids which they identified in the steam distillate of honeys were small amounts of formic and acetic acids, which may have been derived in part from the destruction of a little sugar during distillation. Of the non-volatile acids Nelson and Mottern found malic, citric and succinic acids to exist in small amounts. The presence of lactic, tartaric and oxalic acids, reported by Heiduschka in Swiss honeys, was not confirmed in the case of the American samples. The total acid content of normal high purity

honeys is usually less than 0.1 per cent, so that large quantities of honey must be taken for analysis in order to obtain quantities of acid sufficient for identification.

There are still various uncertainties regarding the origin and properties of the organic acids of honey which must be made the subject of future investigations. One object which the researches of the past 20 years have most thoroughly accomplished is the eradication of the idea that the acidity of honey is due chiefly to formic acid. The suggestion first advanced by Mühlenhof that the bee deposits a minute droplet of formic acid from its stinger in each honey cell, to act as a preservative, should probably be relegated to the realm of fable.

Another debated question in honey research is whether the dextrose or the levulose of honey occurs in greater amount. Of the 92 samples of normal American honeys examined by me in 1907 the levulose percentage exceeded that of dextrose in 90 cases, the average of all determinations being 40.50 per cent levulose and 34.02 per cent dextrose, or a ratio of 119 parts levulose to 100 parts dextrose. In the two exceptional cases there was a doubt as to whether abnormalities might not have occurred through imperfect sampling as a result of the segregation of dextrose by crystallization. Several hundred analyses of honey quoted by König[1] indicate also a preponderance of levulose, the average being 37.11 per cent levulose and 36.20 per cent dextrose. On the other hand the average of 48 pure Russian honeys quoted by König indicate only 29.49 per cent levulose and 41.71 per cent dextrose. Auerbach and Bodländer[2] in some analyses reported in 1924 found the levulose of honey to be always in excess of the dextrose, the ratio being from 106 to 119 parts of levulose to 100 parts of dextrose. With honeys which had been stored many years in bottles Auerbach and Bodländer report ratios of levulose to dextrose much higher than those of fresh honeys, the values ranging from 117 to 181 to 100, from which they conclude that the dextrose of honey may possibly undergo a slow enzymatic condensation to fructose. Since the comparisons in the two cases were not made upon identical samples this conclusion is hardly justified. Periodic analyses of the same samples of honey over a long period of years offer us the only means of determining changes of this character.

With artificial honeys Auerbach and Bodländer found dextrose to be always in excess, a circumstance which led them to recommend the levulose-dextrose ratio as a good method for distinguishing genuine from fictitious honey. Fiehe[3], however, in a more recent article showed that of 45 samples of genuine German honey examined by him 32 showed a greater preponderance of dextrose and only 13 a greater excess of levulose. Fiehe, therefore, condemns this criterion as valueless for distinguishing genuine from adulterated honey.

The question was in such a controversial state that it was subjected anew to a very rigorous test by R. E. Lothrop of our Carbohydrate Laboratory upon 33 genuine American honeys of different floral origin.

[1] Chemische Zusammensetzung der Menschlichen Nahrungs- und Genussmittel, Vol. 1, 4th Edit. (1903) pages 915-929.
[2] Zeitschrift für Untersuchung der Nahrungs u. Genussmittel, 47, 233-238 (1924).
[3] Zeitschrift für Untersuchung der Nahrungs u. Genussmittel, 52, 244-259 (1926).

In every instance the levulose was found to be in excess, the average of all determinations being 39.88 per cent levulose and 33.72 per cent dextrose, the ratios of levulose to 100 parts dextrose ranging from 103 to 170 with an average of 118. These results agree very closely with the 40.50 per cent levulose and 34.02 per cent dextrose which I reported in 1908. The accuracy of Lothrop's results was confirmed by the close agreement of the levulose determinations by two entirely different methods, one based upon the difference in polarization of the honey at high and low temperatures and the other upon the greater resistance of levulose to oxidation by iodine solution according to the procedure of Hinton and Macara.

The general preponderance of levulose over dextrose in honey appears to me to be well established. The extraordinary high percentage of levulose in tupelo honeys to which I called attention in 1908 was confirmed by Lothrop in his recent investigations. He found 46.15 per cent levulose and only 27.21 per cent dextrose or a ratio of 170 to 100. I am inclined to ascribe most of the discrepancies reported in the literature with regard to the preponderance of levulose over dextrose to faulty methods either of sampling or analysis. Honey, because of its tendency to segregate into crystalline and liquid layers, is one of the most difficult products to sample correctly and too much stress cannot be laid upon the importance of securing an evenly mixed product before undertaking the analysis.

In the remainder of my address I shall describe some phases of honey research which I observed during my agricultural tour in various countries of Europe and the Near East in 1929 and 1930. I visited apiaries and saw honey research experiments in England, France, Germany, Switzerland, Egypt and Greece and had an excellent opportunity to observe conditions ranging from the most primitive to the most modern.

For startling contrasts no country has so many things to interest the visitor whether he be a scientist, agriculturalist, manufacturer or archaeologist, as Egypt. The almost perfectly preserved monuments and antiquities of this country carry one back to the very dawn of civilization. It may interest you to know that carved representations of the honey bee appear upon nearly all the obelisks and other monuments of ancient Egypt. The bee served the wants of man and was a symbol of thrift and industry many thousand years before the Christian era. Ancient custom and usage is entrenched nowhere so firmly as in Egypt. Plowing, reaping, winnowing and other agricultural operations depicted upon the walls of tombs and temples are still performed in Egypt according to the same primitive methods of five thousand years ago. And so we find the old mud bee hive, used in the time of the Pharaohs, still in common use. I saw at the agricultural experiment station of Giza, not far from the ancient pyramids a very interesting colony of these very primitive hives, in close proximity to other hives of the most modern type. White clover which flowers from May to July is the principal source of Egyptian honey, cotton which flowers from June to August, ranking second. The bees hibernate in Egypt as in colder climates. The worst enemy of the bee in Egypt is the so-called "date hornet"

(Vespa orientalis) which kills the bees and robs the hives. Ants are also pilferers of honey, and the stands of the hives must have their legs immersed in pans of water or oil to keep out these intruders. The wax moth is another enemy.

Another ancient country which I visited was Greece. The old Greek poets and artists were fond of celebrating the honey bee and Hymettos honey, famous in ancient days, can still be obtained in Greek restaurants. The samples that I tasted had a peculiar peppery flavor, which I was told was due to the preponderance of thyme nectar. I paid an interesting visit while I was in Athens to an apiary near Tatoi, the former summer palace of the late King of Greece. The hives, more than 300 in number, were built of cylindrical baskets and covered with pine branches held in place by stones. Their construction was of a very simple type although not nearly so primitive as that of the mud hives which I saw in Egypt.

My interest in the ancient lore of bee culture, which had been aroused by my visit to the old countries of the Near East, was still further stimulated when I visited the Institut für Bienenkunde of the Landwirthschaftliche Hochschule in Berlin. Professor Ludwig Armbruster, the director of this Institute and president of the Apis Club in 1929, showed me a large collection of hives of clay, straw, wood, bark, and other materials of many different forms, illustrating all the types employed in the various countries of the world. I was shown also a collection of models illustrating the practices of beekeeping among the different peoples with diminutive hives and figures of natives in costume. Those for Egypt and Greece were so exactly like the hives which I had seen in these countries that I felt obliged to compliment Dr. Armbruster upon the accuracy of this part of his exhibit. The practices of beekeeping in the different lands were illustrated also by transparent photographs, and large maps showed the historic developments of bee-culture during the ages. Exhibits illustrating representations of the honey bee in art were also shown, among the finest of these being a beautiful set of plaster impressions of bees from ancient Greek coins and gems. The oldest impressions of honey bees which I saw in Ambruster's collection and also the most perfect were not, however, carved by any human artist, but were the work of Mother Nature herself. These were the stone fossils of bees that lived more than 1,000,000 years ago. Wetting the surface of these impressions caused every detail of the legs, veins of the wings and other markings of these bees to be clearly visible when viewed under the microscope.

Professor Armbruster discussed with me in some detail the extensive researches which he is conducting upon honey. He has worked, as many of you know, upon the enzymes of honey, particularly the diastatic enzymes, a subject in which the German investigators have done very extensive work. At the time of my visit a systematic microscopic study was being made of the types of pollen found in German honeys, a research similiar to the very extensive investigation undertaken by W. J. Young in 1907 upon the pollen of American honeys and published in Bulletin 110 of the Bureau of Chemistry. Professor Armbruster placed more stress upon accurate drawings of pollen grains than upon microphotographs, owing to the impossibility of bringing out all details at a

single focus of the microscope. Armbruster has also worked upon the color of honey, the role of water in the economy of honey production by the bee and many other subjects. He is a tireless worker and deeply grounded in the scientific, economic, historic and cultural phases of his specialty. His Institute of Bee-Culture, like many other educational research institutions in Germany, is suffering greatly at present from lack of resources. Some of the laboratory buildings were mere sheds, and there was need for new equipment. The research spirit was undaunted, however, here as elsewhere in Germany, and the will to work was strong enough to make headway against all limitations.

Another honey expert whom I visited in Germany was Professor Fiehe of the Prussian Hygienic Institute in Landsberg. He is the originator of the well-known Fiehe test for detecting the adulteration of honey with invert sugar. Artificial honey which I encountered frequently in the restaurants and hotels of Europe is prepared by heating a concentrated cane sugar sirup with a small amount of hydrochloric, citric or tartaric acid to a temperature of about 230° F. A certain amount of the levulose which is produced by this reaction is decomposed into a substance known as oxymethylfurfural, which gives distinctive colors with various reagents. One of the first tests proposed for this purpose was the one introduced by me in 1907 by means of anilin which gives a red color with oxymethylfurfural. Shortly afterwards Fiehe proposed the use of Seliwanoff's reagent, a solution of resorcinol in hydrochloric acid, which gives a cherry red color with oxymethylfurfural. The Fiehe reaction is much more sensitive than the Browne test, and for this reason has been preferred. It has, however, the objections of being too sensitive, giving a pink color with genuine honeys which have been heated and also with certain very old honeys.

The failure to differentiate between the various shades of color obtained by the Fiehe test has been responsible for many errors in honey analysis. Two years ago a shipment of genuine American honey to France was refused entry because a French chemist pronounced it to be adulterated upon the basis of the pink color which he obtained with the Fiehe reaction. A sample of this honey examined at our Bureau in Washington gave no coloration by the Browne test and only a faint pink by the Fiehe test. A sample mailed to Dr. Fiehe in Germany was also pronounced by him to be a genuine honey. In order to eliminate these uncertainties of color interpretation Professor Fiehe has recently improved his test by making it a gravimetric method of which he gave a demonstration at the time of my visit. The oxymethylfurfural, after complete extraction from the suspected honey by means of ether, is precipitated with phloroglucinol and weighed in a filtering crucible. From the weight of the precipitate one can calculate the extent of adulteration with added invert sugar. A heated honey, which gives a pink color by the original Fiehe test, gives only a slight precipitate by this means and thus the errors due to faulty interpretation of the color values can be wholly eliminated. We have found in our Carbohydrate laboratory that genuine honeys, unheated, on long storage yield perceptible amounts of decomposition products which give a distinct red coloration by the Fiehe test.

A well known fact, which I pointed out in Bulletin 110, is that certain genuine honeys have a strong inverting action upon sucrose. This circumstance may lead to serious discrepancies in the analysis of honey as the following incident will show. In 1907 while analyzing samples of imported honey for the government I condemned a shipment of Cuban honey because it contained more than 20 per cent of sucrose. The importer of the honey then had a sample of the same honey analyzed by Dr. Geisler of New York, who reported only 10 per cent of sucrose, which was then the permissible maximum. When these discrepancies were brought out some weeks later at a hearing, Dr. Wiley adjourned the meeting until Dr. Geisler and I could reconcile our differences by making analyses of each other's samples. We analyzed my sample first, and great was my chagrin when we found it to contain not 20, but only 10 per cent of sucrose which was the amount that Dr. Geisler had reported. This seemed to indicate that I was in error until we analyzed Dr. Geisler's sample, which we found to contain only a trace of sucrose instead of the 10 per cent which he had announced. The explanation of this peculiar behaviour of the honey was its high content of invertase, which had continued to act upon the sucrose of the honey since the time of the first analysis. The process of inversion proceeded more slowly with my sample because it had been kept in a cooler compartment. With honeys of such high inverting power as the one just mentioned it is possible to add a large quantity of sugar sirup without possibility of its being detected when the natural process of inversion is completed. Witte[4] cites experiments where honeys with a high invertase content were able to invert 60 per cent of added sucrose. All honeys, however, do not show the same high inverting activity so that this form of adulteration is not likely to become common. Satisfactory methods for detecting this possible form of honey adulteration remain to be developed.

The objections of German pure food officials to the importations of honey of low diastatic activity is of interest to American producers, as several shipments of honey from the United States have failed to meet the German requirements. The diastaste of honey contributes but little to its nutritive value, as the natural diastases secreted by the salivary glands, pancreas and other organs of the human body are more than sufficient to meet the ordinary needs of digestion. If because of some physical disability the diastaste secretion of the body is too low there are so many sources of this enzyme better than honey that it appears to me rather puerile to conduct a propaganda for honey consumption upon the basis of its rather low diastaste content, especially as the amount of honey which we consume at a meal is relatively small. This I believe is the general opinion of American food authorities, although several German scientists with whom I discussed the question ascribe a definite physiological value to the enzymes of honey and regard a product in which the enzymes have been destroyed by heating as inferior in quality.

But be this as it may, the assertion of certain German authorities that all honeys below a certain prescribed diastatic value are to be regarded as overheated can scarcely be maintained in consideration of the

[4] Z. Untersuchung d. Nahr.-u. Genussmittel 21, 324 (1911).

very low diastatic values reported by Vansell and Freeborn[5] of the California Agricultural Experiment Station in 1929 for unheated honey. Lately published results by Lothrop and Paine[6] of the Bureau of Chemistry and Soils upon many samples of genuine American honeys kindly supplied by J. I. Hambleton of Bee Culture Investigations of the Bureau of Entomology show that many varieties of unheated honeys, such as tupelo, alfalfa, mangrove, algaroba and orange, are very deficient in diastase. Some samples of unheated orange honey of exceptionally fine quality were in fact almost wholly deficient in this enzyme, thus confirming the observations of Vansell and Freeborn. Recent work by Lampitt, Hughes and Rooks[7] in England also indicates that the diastatic activity of honey is not a reliable means for determining whether a honey has been heated. It is very improbable that a diastatic standard for honey will be adopted in the United States; exporters who ship foodstuff to Germany should assure themselves, however, that their honeys conform to the German regulations in this as in other respects, in order to avoid condemnation of their products.

The question of the origin of the various enzymes of honey is worthy of consideration. It has been demonstrated that the invertase of honey is derived from bees which are able to invert sucrose without difficulty, as proved by sugar feeding experiments. Authorities differ, however, regarding the origin of the honey diastase. The German authority Gothe[8] concludes that the diatase of honey, the same as its invertase, is derived principally from bees. Other authorities attribute its origin to the floral nectar, and a third group specify the pollen grains as the source of the diastase of honey. Among the latter Vansell and Freeborn[9] of the California Agricultural Experiment Station show that the diastase content of raw honeys is proportional to the abundance of pollen grains. In striking confirmation of this hypothesis they show that honey derived from the blossoms of the California Navel orange, which contain no pollen, is almost completely lacking in diastase.

While upon this subject of pollen I must not forget to mention the work which is being conducted by Dr. E. Elser of the Swiss Dairy and Bacteriological Institute of Liebefeld-Bern upon the chemical composition of pollen. I had the pleasure of visiting Elser's laboratory in September, 1929, and was greatly interested in the chemical research work upon honey which he is conducting.

Among other honey investigators whom I visited during my foreign tour were D. M. T. Morland of the Rothamsted Experiment Station in England, who showed me his interesting self-recording apparatus for studying the activities of bees in the hive, and Ph. J. Baldensperger of Nice in France, who succeeded Dr. Phillips as president of the Apis Club in 1927, and notwithstanding his 76 years is as active and alert as a man of thirty. Mr. Baldensperger and the other foreign research workers upon honey whom I met during my foreign tour wished me to convey their greetings to their American colleagues.

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[5] Jour. Economic. Entomology 22, 922 (1929).
[6] Ind. & Eng. Chem. 23, 71 (1931).
[7] Analyst, 55, 666 (1930).
[8] Zeit. für Untersuchung d. Nahrungs-u. Genussmittel 28, 286 (1914).
[9] Jour. Economic Entomology 22, 922 (1929).

In closing this very fragmentary sketch of the chemical research work upon honey at home and abroad, in which I have limited myself chiefly to matters that have come under my personal observation, I should like to indicate some of the lines of investigation upon which chemical research appears to be especially needed. We require above all else more fundamental research upon the chemical composition of the food of bees in the various common types of floral nectars and the honey dews. Studies of this character in connection with simultaneous research work upon the composition of the honeys produced from each type of nectar will contribute greatly to our understanding of some of the unsolved problems of honey chemistry. This type of research involves most delicate analytical technique, but we have now at our command the newer methods of microchemical analysis—a resource which was largely lacking to the investigators of a few years ago. We need also to study the character of the enzymes, organic acids, nitrogenous substances, colloids and other ingredients of honey from bees specially fed upon sirups, pollen and other food of known composition in order that we may have exact information as to what constituents of honey are of insect or plant origin. Another type of research of which there is great need is a study of the chemical changes which take place in honey when stored under different conditions of light and temperature. This will involve periodic analyses of type samples of honey over a long period of years. The products of bacterial action upon floral nectars, honey dews and honey also require to be more thoroughly investigated.

In addition to these chemical studies upon the various constituents of honey we require more extensive technical studies upon methods for the utilization of honey. I was particularly impressed when I was in France with the wide range of excellent confections, cakes, etc., which are made from honey by the candy makers and bakers of that country. The introduction of some of these products of the French confection and culinary arts would help greatly to widen our domestic market for honey.

These are only a few of the many lines of chemical research which remain to be conducted upon honey. Such research work for its best accomplishment demands the closest and most cordial cooperation between highly trained analytical chemists and entomologists who are skilled in apiculture. It is in that borderland where the work of our scientists overlap that research attains its highest degree of development and success.

THE MICROBIOLOGY OF HONEY.*

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INTRODUCTION.

It may be stated as a general rule that most of our foodstuffs which are so valuable for human nutrition possess the disadvantage of being suited to the growth of other living things beside ourselves. The very qualities which make such foods so nutritious to us render them equally nutritious to microscopic forms of life, and honey appears to be no exception to the general rule. Under certain conditions, germ life may find opportunity for growth and development to such an extent that honey may be rendered unfit for purposes of general consumption. Hence the microbiology of honey, or in other words, its relation to germ life, is a subject in which beekeepers may well be interested.

Compared with a substance like milk, which is probably the food most susceptible to the action of germ life capable of spoiling quality, honey is relatively resistant and possesses certain characteristics which help it to ward off many of the types of spoilage which certain other foodstuffs undergo.

HONEY IN RELATION TO BACTERIA.

Honey is fortunately a very unsuitable medium for the growth of bacteria for two important reasons. In the first place honey is acid in reaction, a circumstance which renders it a very unfavorable place for bacteria in general to grow in, but very few types being able to thrive in any solution having the degree of acidity which honey possesses. A second very favorable factor is seen in its high sugar content approximating 80 per cent. Honey, therefore, represents a medium of high osmotic pressure which is exceedingly unfavorable to all but a relatively small group of bacteria, for most species are unable to grow and multiply in solutions of more than 15 or 20 per cent sugar. Hence, through a happy combination of circumstances, namely acidity and high density, honey may be regarded as practically immune from bacterial action. In 1919 a study made by Sackett of the longevity in honey of bacteria capable of causing intestinal diseases showed that when these organisms of the typhoid group were introduced they died within several hours or a very few days at the most. Thus the probability of honey acting as a carrier of typhoid fever, dysentery and related diseases is very slight indeed. There is no doubt that those bacteria which are able to produce spores are able to offer greater resistance and thus remain dormant for considerable periods of time. Such a type is represented by *Bacillus*

* Paper presented at the League Convention, Toronto, Canada, February 9-11, 1931. Because of the cost of plates, part of the figures referred to have been omitted. Reprinted from The American Honey Producer, 5 :83-89, September, 1931.

larvae and *Bacillus alvei,* both organisms associated with foulbrood diseases of bees. Actual multiplication or growth of such bacteria in honey, however, is regarded as impossible or extremely improbable.

Yeasts in Honey.

What is true of bacteria is also the case with most of the other microorganisms which may come in contact with honey. Saccharine liquids in general are more susceptible to the action of yeasts than of any other group of microbes, and in natural juices such as sweet cider, grape juice, etc., which in addition to being sweet are acid in reaction, yeasts rather than bacteria find best opportunity for development. Honey, however, through its high concentration of sugar, is able to hinder the growth of ordinary yeasts which are able to grow in solutions of lower sugar content and is therefore immune against the majority of yeasts. Nature, however, has added to the troubles of the beekeeper and has evolved a race of sugar-tolerant yeasts which are able to live and thrive in high concentrations of sugar in which ordinary yeasts are completely restrained. In brief, then the microbiology of honey, is for most practical purposes, confined to a study of the behaviour of this group of sugar-tolerant yeasts. As far as we know, they are the only microorganism capable of affecting honey. In Fig. 1 the difference between sugar-tolerant and ordinary yeasts in their ability to grow in honey solutions of different strengths is clearly shown.

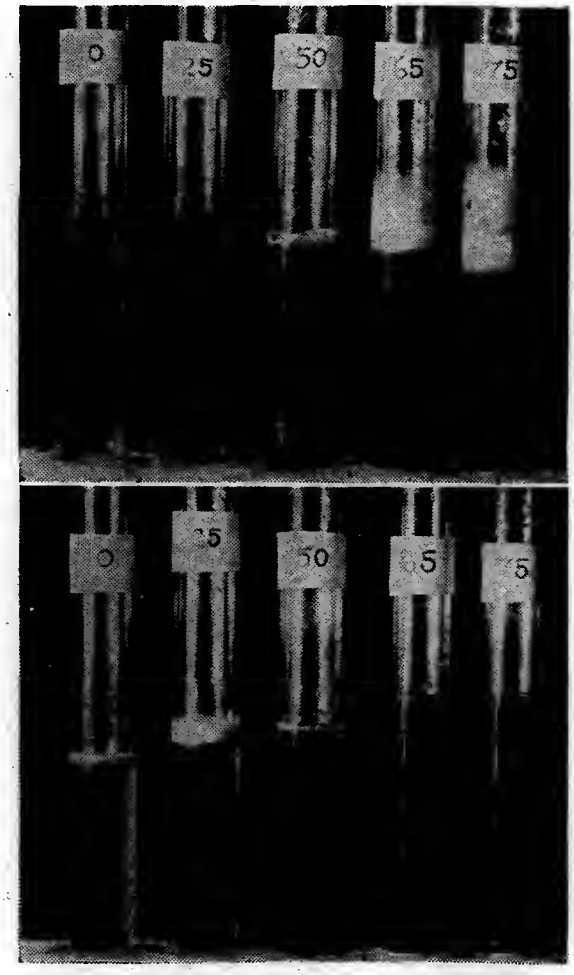

Figure 1—Difference between honey-fermenting yeasts and ordinary yeasts in fermenting honey solutions of different strengths. Yeasts from honey are able to ferment higher concentrations best, while ordinary yeasts, shown in the lower series, are able to ferment less concentrated solutions though unable to ferment honey solutions of higher density.

Honey Fermentation.

Our chief concern with yeasts in honey lies in their capacity for spoiling the product by fermentation. The relation of sugar-tolerant yeasts to fermentation was first observed in 1910 by Nussbaumer in Switzerland, and investigations conducted since then have confirmed the view that yeasts are the agents responsible. In recent years spoilage of extracted honey has become a matter of concern to American and Canadian beekeepers and others engaged in the handling and marketing of honey, due partly to the fact that honey is

now being held for longer periods of storage than formerly. Lately, therefore, the increasing losses which producers and exporters have experienced from fermentation have given an impetus to investigational work on honey fermentation in the United States and Canada, and our knowledge of the factors concerned has been considerably enlarged. At the Central Experimental Farm at Ottawa we have been working on the subject of honey fermentation for the past three and a half years, receiving cooperation from the Bee Division, the Division of Chemistry, and the National Research Council of Canada, and in this paper an attempt will be made to give an outline of the results obtained to date.

Yeast in Fermented Honey.

From every sample of fermented honey examined sugar-tolerant yeasts have been isolated which are capable of fermenting high concentrations of honey when inoculated in pure culture. A number of samples of honey have been analysed quantitatively for yeasts, and it was found that the actual numbers of yeast cells present varied greatly. In a series of 13 samples of fermented honey the number of yeast colonies obtained ranged from 6,100 to 380,000 per gram (1-5 teaspoonful). The samples in question had fermented approximately 6 months before being examined, and it is probable that in some cases at least the yeasts tend to diminish after the most active stage has passed. In other tests of more recently fermented honeys we have obtained counts of over 1,000,000 yeasts per gram.

The yeasts responsible for honey fermentation are not all of one type. By employing bacteriological methods for isolating them and studing their form and cultural characteristics it is possible to recognize several fairly distinct species. In the course of our studies of fermented honey samples in which 130 cultures were studied and compared, four different types of yeasts were found, but further studies of sources of infection have shown that the number of types actually capable of fermenting honey is much larger. Studies of types of sugar-tolerant yeasts are still under way, but up to the present at least a score of different types of yeasts have been isolated from various sources capable of fermenting honey, some much more widely distributed in nature than others. In Fig. 2 is shown a "giant" colony of a yeast isolated from fermented honey (*Zygosaccharomyces nussbaumeri*), illustrating how it appears to the naked eye when cultivated in pure culture. Fig. 3 (omitted) shows the appearance of the same yeast as seen

Figure 2—Giant colony of yeast found in fermented honey.

under the microscope, and illustrates the arrangement and shape of the cells when cultivated under various conditions.

Sources of Infection of Honey by Yeasts.

With yeasts definitely established as the active agents in fermentation, it will be realized that measures to combat spoiling will be two-fold in scope. Fermentation may be prevented firstly by checking the growth of yeasts already present by such means as heat, the use of chemicals or storage at low temperature; or secondly, by reducing the contamination of honey by such yeasts to a minimum. Hence it is a matter of interest to learn something of the possible sources of infection of honey.

(A) *Flowers visited by bees.*

The nectar of flowers visited by bees naturally suggests itself as a possible source of contamination of honey by yeasts, and consequently a series of experiments was conducted, extending from June to September, in which examinations were made of floral nectar embracing 34 varieties of flowers. Out of 44 examinations made, negative results were obtained in but 3 instances. The yeasts were furthermore isolated in pure culture and studied in detail, with the result that 11 different types were found from a comparative study of 71 cultures obtained from this source. Naturally some species were much more prevalent in nectar than others. While some were restricted to one or very few types of flowers, others were encountered in a wide range of flowers throughout a comparatively long period. In Fig. 4 (omitted) and 5 is shown the yeast which was found to be most prevalent, being isolated in 20 cases from such flowers as dandelion, apple blossom, honeysuckle, cherry blossom, Dutch and alsike clovers, sweet clover, buckwheat and sunflower. This yeast has also been found in fermented honey.

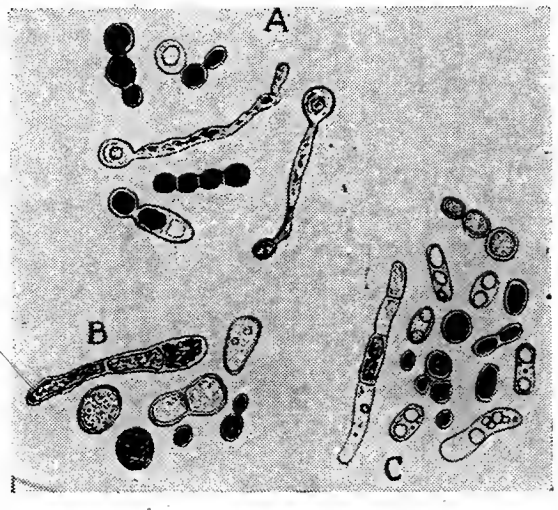

Figure 5—Microscopic appearance of most prevalent yeast found in floral nectar.

Of the 11 types of yeasts, 3 proved identical with types already reported from fermented honey, although all were capable of fermenting honey in pure culture and must be therefore regarded as potential causes of spoiled marketed honey.

(B) *Yeasts in hive nectar during the honey flow.*

Coincident with the experiments just mentioned a study was also made of the presence of honey-fermenting yeasts occurring in hive nectar during the same period, namely June 1 to September 14. In the course of 57 examinations it was found that in every sample of nectar there was evidence of the presence of sugar-tolerant yeasts capable of

causing fermentation. Out of 60 yeast cultures which were isolated from hive nectar and compared, however, but 4 different types were found. Of these 3 proved to be similar to types found in floral nectar, while 2 were, in addition, identical with yeasts actually isolated from fermented honey. In connection with the yeast infection of floral and hive nectar it is of interest to observe that other investigators have isolated honey-fermenting yeast from the bodies of bees, thus furnishing a link between flower and hive, and strengthening the assumption that the bees act as carriers of yeasts to the comb.

(C) *Honey-fermenting yeasts in the soil.*

With the object of learning to what extent soil may be regarded as a source of honey-fermenting yeasts an investigation was carried out, during the course of which soil from a number of different locations was examined throughout a twelve-month period. Soil from an old established apiary was tested in addition to new apiary ground being used for the first time. Furthermore, soils from a flower garden, from an orchard, from a clover field and from a cereal field were likewise examined. The results, outlined in Table 1, indicate that only in the case

TABLE 1—INCIDENCE OF SUGAR-TOLERANT YEASTS IN SOIL.

Date of sampling.	Percentage of samples showing fermentation.					
	1 Flower garden.	2 Apiary—new ground.	3 Apiary—old ground.	4 Orchard.	5 Clover field.	6 Cereal field.
May 22, 1929	0	8.3	66.7	0	0	0
June 5, 1929	0	16.7	83.3	0	8.3	0
June 18, 1929	0	16.7	50.0	0	0	0
July 31, 1929	0	16.7	50.0	0	0	0
Aug. 19, 1929	0	50.0	50.0	0	0	0
Aug. 30, 1929	0	25.0	66.7	0	0	0
Sept. 11, 1929	0	16.7	41.7	0	0	0
Sept. 25, 1929	0	0	75.0	0	0	0
Oct. 16, 1929	----------	33.3	66.7	----------	----------	----------
Nov. 21, 1929	----------	58.3	41.7	----------	----------	----------
Dec. 16, 1929	----------	25.0	50.0	----------	----------	----------
Jan. 16, 1930	----------	25.0	58.3	----------	----------	----------
Feb. 13, 1930	----------	25.0	33.3	----------	----------	----------
Mar. 18, 1930	----------	33.3	75.0	----------	----------	----------
Apr. 17, 1930	----------	16.7	50.0	----------	----------	----------

of the apiary ground is the soil regularly infected by sugar-tolerant yeasts. Samples from the other locations, from May to the end of September, when yeast infection might be considered most probable, all yielded negative results with one exception. The findings support the view that ordinary field soil is not to be regarded as a primary source of infection of honey. In the case of the apiary soil it is of interest to note that the soil from the older part was much more heavily infected than soil being used for the first time. It appears reasonable to conclude that in the apiary, the soil becomes more or less rapidly contaminated with yeast from droppings of wax, nectar and from dead bees. The soil apparently serves as a resting place for honey-fermenting yeasts, yet it may constitute a source of seasonable reinfection through such agencies as wind or insects.

From the soil 166 cultures of yeasts were isolated and compared. These were found to represent 7 types of which 3 had already been recognized in fermented honey. Fig. 6 and 7 depict a yeast found in soil while the two types shown in Fig. 2 to 5 were also isolated from this source.

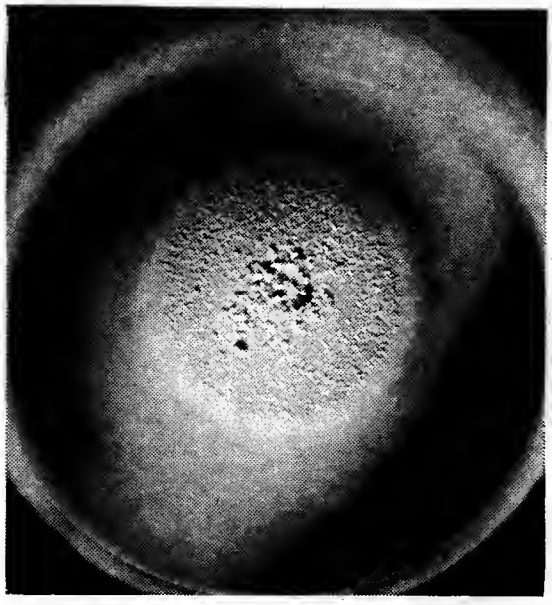

Figure 6—Giant colony of yeast found in apiary soil.

(D) *Yeast infection during extraction.*

The infection of honey from such sources as floral nectar, soil, etc., may be said to be beyond the power of the beekeeper to prevent. The blame must be laid chiefly upon the bee, while other insects and the wind may be regarded as lesser agents. The process of extraction, however, is one over which the beekeeper exercises control, and hence he should be able to influence the extent of contamination of honey once it is removed from the comb. The possibility of infection in honey at the time of extraction, through contamination from utensils, from air, etc., was made the subject of an investigation. Examinations made of the interior centrifuge tanks, of holding tanks and pipe lines showed that these may represent more or less serious sources of infection. From such sources 4 types and from the air of the extracting house one type of honey fermenting yeasts were isolated, 3 of which had been previously reported from fermented honey.

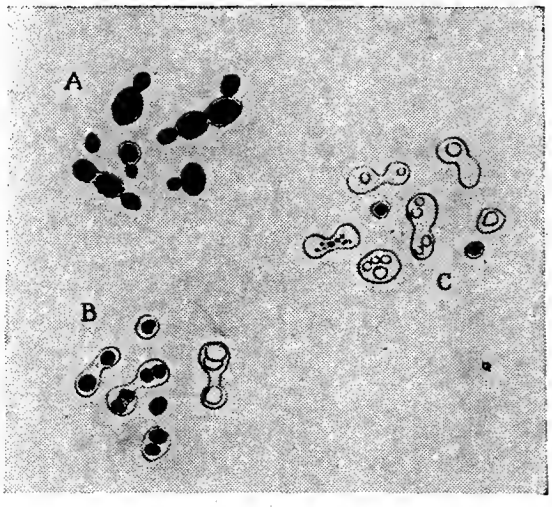

Figure 7—Microscopic appearance of yeast of Fig. 6 found in apiary soil.

In view of these results there is reason for believing that in the case of extracted honey at least, yeast contamination is partly within the control of the beekeeper, and that by exercising careful precautions to maintain strict cleanliness at the time of extraction, and to insure that his containers, tanks and utensils are as nearly sterile as possible, a portion of yeast contamination may be eliminated. Traces of honey or nectar, particularly if left so that moisture may be absorbed, offer extremely favorable conditions for the multiplication of yeast cells, and there is no doubt that from a well

cleaned extracting house a better grade of honey with less tendency to ferment will be produced than from one where the same sanitary measures are not taken.

Yeast Infection of Normal Honey.

In view of the possibilities of infection previously discussed it is perhaps natural to inquire whether all honey is contaminated by sugar-tolerant yeasts, and if so, whether it makes any difference how heavily it is infected. No previous information is available, as far as the writer is aware, relating to the amount of infection in normal honeys, and consequently an investigation was made to determine to what extent honey from different localities and of different floral sources is contaminated. Furthermore it was planned to obtain information on the question as to whether the amount of yeast infection, as distinct from the mere presence of yeast, is a factor in causing fermentation. For this work approximately 200 samples of honey, in duplicate, were obtained from all parts of Canada. One sample was kept for storage test, the other being used for bacteriological and chemical examination.

As a result of the yeast count it was found that of 191 samples of honey not a single one was found to be free from sugar-tolerant yeasts. The amount of infection, however, was found to vary greatly, ranging as it did from 1 in 10 grams to over 100,000 per gram of honey, with a median count of 1,000 per gram (see Table 2). The most heavily infected honey had thus a million times the yeast count of the least infected.

TABLE 2—SUMMARY OF YEAST COUNTS OF 191 SAMPLES OF NORMAL HONEY.

Yeast Count.	No. of Samples.
1 in 10 gram	3
1 in 2 gram	2
1 per gram	6
5 per gram	9
10 per gram	7
50 per gram	15
100 per gram	28
500 per gram	24
1,000 per gram	33
5,000 per gram	27
10,000 per gram	24
50,000 per gram	9
100,000 per gram or more	4

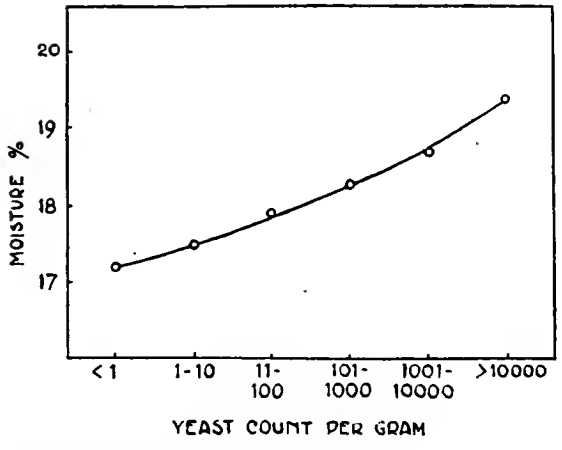

Figure 8—Yeast count of honey in relation to fermentation.

The relationship of yeast count to fermentation is indicated in Fig. 8 which indicates, for different yeast count groups the percentage of samples fermented after 14 months' storage. It will be noted that the higher the initial yeast count of honey the greater is the probability of its fermenting. A determination of the yeast count serves therefore as some measure of its fermenting tendency. Whether the amount of yeast in-

fection stands in casual relationship to fermentation, however, can be determined only by considering other possible factors which have a bearing on fermentation.

When the results of the chemical analysis of the samples were correlated with the yeast infection it was found that but one prominent relationship stood out, namely that between yeast count and moisture. As shown in Fig. 9, the amount of yeast infection tends to rise with increasing moisture. It remained to be determined whether the yeast count is merely a function of the moisture or whether it stands in casual relationship.

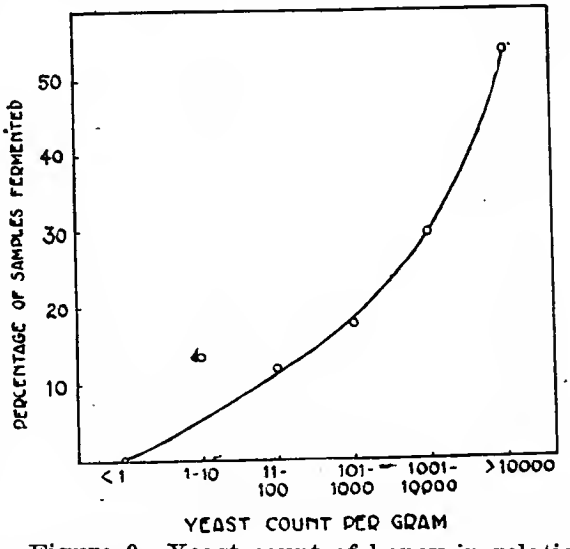

Figure 9—Yeast count of honey in relation to moisture.

The samples were divided into groups on the basis of moisture content, as shown in Table 3, and within each group fermented and unfermented samples respectively were considered with regard to their original yeast count.

From the table it will be observed that the fermented samples tended to reveal a higher contamination than the unfermented, irrespective of the moisture content. Thus by eliminating this most important factor, it is seen that the yeast count is significant. From the data there is evidence to support the view that the yeast count of honey, as distinct from the mere presence of yeast, is a factor which directly affects fermentation. Hence there is justification for advising care and extreme cleanliness at the time of extraction to minimize yeast infection.

TABLE 3—YEAST INFECTION IN RELATION TO FERMENTATION OF HONEYS OF DIFFERENT MOISTURE CONTENT.

Moisture %.		Number of samples.	Yeast count.	
			Average.	Median.
Less than 16.1	Fermented	0		
	Unfermented	3	350	50
16.1–16.5	Fermented	0		
	Unfermented	8	90	30
16.6–17.0	Fermented	0		
	Unfermented	19	2,700	50
17.1–17.5	Fermented	0		
	Unfermented	13	1,290	500
17.6–18.0	Fermented	2	5,050	5,050
	Unfermented	31	1,410	500
18.1–18.5	Fermented	3	5,340	5,000
	Unfermented	36	4,490	1,000
18.6–19.0	Fermented	7	32,350	10,000
	Unfermented	19	9,690	5,000
19.1–19.5	Fermented	14	9,940	750
	Unfermented	9	8,430	500
19.6–20.0	Fermented	3	5,340	5,000
	Unfermented	3	18,670	5,000
More than 20.0	Fermented	8	26,960	7,500
	Unfermented	4	430	300

Effect of floral origin and geographical distribution.

In our investigations, no outstanding differences were found in the yeast infection of honeys with respect to their floral origin. Honeys containing buckwheat nectar showed however, a notably higher moisture content than those of other floral origin and a greater tendency to ferment.

Some very interesting results were obtained respecting the relation of the yeast infection of honey to the geographical origin, and in Table 4 is presented a summary showing the yeast counts and moisture content of honey from different portions of Canada. In view of the possibility that differences in honey from different areas might be ascribed to differences in floral origin, the table contains, in addition to data on all samples, a summary relating only to those described as clover honeys.

TABLE 4—GEOGRAPHICAL DISTRIBUTION IN RELATION TO YEAST COUNT AND MOISTURE CONTENT OF CANADIAN HONEYS.

Location.	Number of samples.	Yeast count.				Moisture %.		Fermented.	
		All samples.		Clover only.		All samples.	Clover only.	No.	%
		Av.	Median.	Av.	Median.				
British Columbia	18	1,010	100	200	100	17.2	17.5	1	5.6
Prairie Provinces	64	1,710	100	1,320	100	17.9	17.6	8	12.5
Ontario	57	7,850	1,000	5,610	5,000	18.4	18.3	15	26.3
Quebec	43	11,950	5,000	15,390	5,000	19.2	19.0	13	30.2
Maritime Provinces	9	20,330	10,000	10,000	10,000	18.3	18.2	3	33.3

It will be observed that Western honeys show noticeably less infection than those from the Eastern Provinces. Samples from British Columbia and the Prairie Provinces are likewise characterized by a lower average moisture content, so that with a combination of favorable factors, western honeys show a lower percentage of cases of fermentation than eastern honeys; indeed a progressively increasing yeast count was found from West to East which corresponded with the tendency to ferment. Just to what extent the lesser yeast infection of western honeys is to be ascribed to lower moisture, less contaminated nectar, soil, etc., or more careful handling is not yet possible to determine.

Prevention of Fermentation.

From our knowledge of yeast infection, it appears that for practical purposes we must regard all extracted honey as containing sugar-tolerant yeasts in greater or lesser numbers. Prevention of fermentation lies largely therefore, in destroying these yeasts or rendering them incapable of growth. Storage at a temperature of 50° F. or lower illustrates a method of hemming them, while heating the honey is directly destructive of the cells. Both methods have their disadvantages. Low temperature storage is not readily feasible on the store counter, while the heating of honey to such temperatures as insure destruction of yeasts entails, in addition to possible deleterious effects on flavor, the impairing of the

diastase content, a matter of importance in connection with the exportation to Germany, where the diastase test is used in determining adulteration.

The use of preservatives has been given some study by us and quite apart from the question as to whether the use of such substances, as are widely used in other foodstuffs would be generally acceptable, it was felt that information was needed as to their effect on the action of sugar-tolerant yeasts found in honey.

TABLE 5—EFFECT OF PRESERVATIVES ON HONEY FERMENTATION (80% HONEY).

Preservative.	Limit permissible.	Lowest concentration not fermenting.	Remarks.
Sodium benzoate	0.10% as benzoic acid	0.05%	Promising.
Sodium borate	0.5% B_2O_3	0.1%	Low solubility a disadvantage otherwise promising.
Sodium salicylate	0.02% as salicylic acid	0.06%	No preservation within limits permissible.
Sodium sulphite	0.05% SO_2	0.01%	Promising.
Sodium bisulphite	0.05% SO_2	0.025%	Promising.
B-K (sodium hypochlorite)		All fermented, 100 p.p.m. Cl_2 highest concentration used.	Unsuitable, marked chlorine flavour in all.
Santamine (Chloramine-T)		All fermented, 100 p.p.m. Cl_2 highest concentration used.	Unsuitable, marked chlorin flavour in all.
Hexyl resorcinol		0.01%	Insolubility in water and cost are disadvantages.
Hydrogen peroxide		0.5%	Unsuitable on account of taste and bleaching effect.

Effect of Preservatives on Honey Yeasts.

In the course of the tests nine preservatives were chosen, all of a non-poisonous nature and with a low degree of toxicity for animal organisms and whose use is, or might be, permitted in food-stuffs. The concentrations chosen were selected to include the limits permissible under the regulations of the Food and Drugs Act where given therein.

The results of the tests are summarized in Table 5 which shows the effect of the preservation in preventing fermentation in an 80 per cent honey solution, inoculated with a mixed culture of 4 different yeasts from fermented honey.

Of the substances tried out the most promising results were obtained with sodium benzoate, sodium sulphite and sodium bisulphite, all of which compounds were found to exert, under the experimental conditions, a preventive effect on fermentation within the limits permissible in foodstuffs, and are being tried out on a larger scale. The action of sodium benzoate is shown in Figs. 10 and 11 (omitted) in which the preventive effect of a concentration of 0.05 per cent is clearly indicated.

Conclusion.

The more we study fermentation the more we are convinced that it is due, not to a single factor, but to a number of causes, chief of which are moisture and yeast infection, and naturally conditions which affect yeast infection, and moisture will indirectly affect fermentation.

Thus crystallization, by altering the moisture relationship in the liquid portion, has an important bearing on fermentation, and if it were definitely preventible, many cases of spoilage in ripe honeys would be avoided. The problem of yeast growth in honey is indeed a many-sided one, and by increasing our knowledge of these microorganisms in relation to their environment we hope thereby to aid towards a better control of the product which should react to the benefit of producer and consumer.

CRYSTALLIZATION OF HONEY.*

(E. J. Dyce, Guelph, Canada.)

The inadequate control of fermentation and crystallization of honey has been a serious handicap in marketing honey. The only suitable method of controlling fermentation now in use is to heat honey sufficiently to destroy the yeasts. Beekeepers and packers commonly heat their honey to excess, not only to destroy yeasts but to delay later formation of coarse crystals until the honey is consumed. Excessive heating drives off aroma, may break down sugars, and causes the honey to be lowered in quality and darkened in color.

The market quality of granulated honey is directly influenced by size of crystals. Honey which forms fine crystals is more palatable than honey which contains coarse crystals. To market honey successfully, it is necessary to improve the product by causing all honeys to form fine crystals.

The following is a brief outline of steps to be taken and factors to be observed in producing honey with fine crystals.

Since all honeys are assumed to contain yeasts it is advisable to heat all honeys. This destroys the yeasts and liquifies any coarse crystals which may be present. The honey should then be cooled as quickly as possible.

At a temperature of about 75° F. the starter of previously processed honey is added. The temperature at which the starter is added need not be exactly at 75° F. It is necessary only that the temperature be so lowered that the small crystals will not be liquified. At a temperature of about 75° F. the consistency of the honey is such that a thorough mixing of the starter with the liquid honey is easily accomplished. If the temperature of liquid honey is too low, such a mixing is more difficult. If the honey is of high consistency, it is desirable to introduce the portion of finely granulated honey at slightly higher temperatures, while for thinning honeys, a temperature slightly lower than 75° F. is more favorable.

It is not necessary to add a large amount of starter but it is necessary that the crystals added be fine. In general, the larger proportion of starter used, the more speedy is further crystal formation. For practical purposes, from 5 to 10 per cent of the added material seems preferable and a good working rule is to add about 5 per cent.

It is desirable that there be a thorough mixing of the two portions so that the minute crystals may become thoroughly distributed in all proportions of the liquid honey. The length of time agitation should be continued varies with type of equipment but in general about fifteen minutes is sufficient.

* Summary of paper presented at League Convention, Toronto Canada, February 10. 1931. Reprinted from The American Honey Producer, 5:56, July, 1931.

After the starter is thoroughly incorporated into the liquid honey it is desirable to run the honey immediately into the final containers. Formation of crystals takes place in the containers, and the possibility of yeast contamination from the air is lessened. It is desirable that all processed honeys be placed in containers which are capable of being sealed hermetically, so that the honey may not be subjected to any change in atmospheric humidity.

It is now desirable to place the honey at such a temperature that further crystal formation will progress with greatest rapidity. For honeys of average consistency, a temperature of about 57° F. has given most rapid crystal formation. For honeys below the average specific gravity a temperature slightly below 57° F. has given best results while for more concentrated honeys, a slightly higher temperature may give added speed to the process. For average honeys best results are obtained when temperatures are maintained as nearly constant as is practicable.

If correct temperatures and other factors are observed processed honey should reach the solid stage of crystallization in from two to four days. Speed of crystallization is desirable not only for maximum utilization of the equipment but especially from the standpoint of the size of crystals and the quality of the processed honey.

After granulation has occurred the honey can be removed from the constant temperature and may then be kept at ordinary room temperature without fermentation or liquifying. Honeys abnormally low in specific gravity tend to soften or liquify at room temperature while those abnormally high in specific gravity may remain quite solid even at high temperatures. The relation of sugars present in the honey effects the consistency of crystallized honey. Those high in levulose soften and tend to liquify at room temperatures more than do those honeys which are high in dextrose, but for normal honeys, the relation of sugars should not materially effect the consistence of crystallization.

HONEY IN DAIRY PRODUCTS.*

(By H. A. SMALLFIELD, Dairy Dept., Ontario Agricultural College, Guelph, Ontario.)

Honey producers, in common with all other producers, are constantly seeking to develop new products, or a combination of honey and some other product, which will prove acceptable to the consumer, and thereby increase the consumption of honey.

The association of milk and honey dates back to ancient times, and the combination was considered a rare delicacy in those days. Despite this early association no serious study of the possibility of developing an outlet for honey through dairy products, or vice versa, has been made until comparatively recent years.

Ice cream manufacturers were probably the first to turn their attention to the use of honey. Theirs, however, was a case of expediency rather than a desire to develop a place for honey in ice cream. During the war ice cream was classed as a luxury and consequently the percentage of sugar allowed for sweetening the ice cream was limited. This meant that manufacturers had to supplement the sucrose with invert sugar syrup, corn sugar or syrup, or honey. The result was that honey was used in many cases to supplement the sucrose. When conditions returned to normal the manufacturer reverted to all sucrose for economic reasons.

Today we can point to a number of dairy products in which honey has been successfully used, and which may prove helpful in increasing the use of honey. A resumé of the use of honey in various dairy products and their possibilities in the light of our present knowledge follows.

HONEY IN ICE CREAM.

It is only recently that any experimental work on the possibility of using honey to replace part of the sucrose in ice cream has been done. It is true that during the world war, when sugar was high in price and difficult to obtain, some manufacturers used a combination of sucrose and honey for sweetening the ice cream, but as soon as this period was passed the manufacturer reverted to the use of sugar alone. Lucas[1] has reported the results of some work on the use of honey in ice cream, and also the use of a mixture of honey and cocoa butter as a coating for ice cream bars.

He states that ice cream made with honey froze more slowly than sugar sweetened mixes, that the body and texture were very satisfactory, and the cost per gallon compared favorably with a mix prepared from the usual ingredients when it is taken into consideration that no other flavoring is required.

* Paper presented at League Convention, Toronto, Canada, February 10, 1931. Reprinted from The American Honey Producer, 5:51-54, July, 1931.

[1] Lucas, P. S. Ice Cream Field. Vol. XVII, No. 5.

This investigator also reports on the use of honey as a coating for ice cream bars similar to the chocolate covered bars. A combination of one part of cocoa butter with one part of either basswood or white clover honey gave the most pleasing coating. He considers that this coating would not be satisfactory for machine dipping as it congeals rather too slowly.

Tracy, et al,[2] have also published some very interesting results on the use of honey in ice cream, to replace a part, or all of the sucrose. Their work gave special consideration to the effect of honey on the flavor, the body, the freezing process, the hardening of the ice cream, and on its melting resistance.

They found that the predominating flavor in honey ice cream depends on the kind of honey used. Some of the honeys gave the ice cream an undesirable flavor, while others, notably sweet clover, alfalfa, clover, basswood, white clover and orange proved quite acceptable.

Various proportions of sugar and honey were tried, and the sample containing 13.5 per cent honey and 3.5 per cent sugar was the most popular. At least 9 per cent honey is needed in the ice cream to impart an appreciable honey flavor in the mix according to these authors, and 16 to 18 per cent should be used when no sugar is to be used. As honey is not as sweet as sugar, pound for pound, 25 to 30 per cent more honey than sugar has to be used to obtain the same sweetness in the final product.

Not all ice cream flavors were found to blend well with the honey. Vanilla was one of these. One of the best combinations they found was grapenuts in honey ice cream. Some of the samples containing honey did not store as well as others, a few of the samples containing high percentages of honey developing an objectional stale flavor.

According to the results of these investigators the honey ice cream was somewhat smoother, and a little sticky, but not seriously so.

Summing up the remainder of this investigation briefly, they found that as the percentage of honey increased, the time required to freeze and whip the ice cream was increased; that honey ice cream was softer in the hardening rooms, and melted faster when exposed to room temperatures; that honey increased the cost of the ice cream, but when it is considered that the honey also flavors the ice cream this increase is not out of proportion.

This investigation is the first real, detailed study that has been made of the possibilities and limitations of honey in ice cream. In view of its effect on the freezing and storage of the ice cream it would not seem likely that its use as a sweetening agent for ice cream would become very general. However, many ice cream manufacturers are continually seeking new flavors for their product so that the consumers' appetite for ice cream will not become jaded, and honey ice cream would, no doubt, prove a pleasing variety.

Honey may also be used as a topping for ice cream sundaes, according to Lucas.[3] In using the honey it should be diluted with one-third to one-quarter of water, otherwise, it will be too stiff when chilled by the ice cream.

[2] Tracy Ruehe and Sanman. Canadian Dairy and Ice Cream Journal, Vol. 8, No. 12.

[3] Lucas, P. S. Correspondence.

Another possibility which has been tried out at the Dairy Department at the Ontario Agricultural College at Guelph is to melt some granulated honey to a creamy consistency, and mix chopped nutmeats with it. This mixture is then used to make a center layer in a brick of vanilla ice cream. This makes a very delicious brick, and while the quantity of honey that might be used in this way is not very great, it is still another outlet for honey.

Honey in Water-Ices and Sherbets.

Recent experimental work at the Dairy Department of the Ontario Agricultural College has demonstrated the possibility of using honey to prevent the occurrence of a defect which frequently appears in water-ices and sherbets. This defect known as "crust formation," is due to crystallization of the sucrose, and appears first as small, raised, whitish spots, that gradually increase in size. Dahlberg[4] found that by substituting part of the sucrose with corn sugar that this defect could be overcome. He also stated that any invert sugar could have been used in place of corn sugar.

With this latter point in mind a series of experiments on the possibility of using honey to prevent the crystallization of the sucrose were undertaken. The points studied in this investigation were as follows: Will honey successfully prevent crystallization of the sucrose, what percentage of honey should be used? the grade of honey that can be used, the effect of using honey on the cost of the mixture, and whether or not honey will blend satisfactorily with various flavors that may be used for water-ices?

The results obtained allowed the following conclusions:

Honey can be satisfactorily used to prevent crust formation on the exposed surfaces of water-ices and sherbets. Proportions of 22 per cent sucrose and 8 per cent honey gave the most desirable results. Honey lower in grade than "Golden" imparts a strong flavor to the product that is not desirable. "Golden" grade proved very satisfactory in these trials. Honey was found to blend satisfactorily with various flavors that might be used in water-ices and sherbets. Where whole milk was used in a sherbet mix the product had a poor flavor. Where ice cream mix was used in a sherbet mix the defect noticeable where whole milk was used did not appear. The use of honey increases the cost of the mixture slightly.

A formula which we have found to give very good results is made up of the following ingredients:

62.35 lbs. water.
22.00 lbs. Sucrose.
8.00 lbs. Honey.
.50 lbs. Gelatine.
.40 lbs. Citric Acid Crystals.
6.75 lbs. Ice Cream Mix.

The above ingredients, with the exception of the ice cream mix, are heated to 150° F. for 30 minutes, and then cooled. The ice cream mix, and the necessary flavoring materials, are added just prior to freezing.

[4] Dahlberg, A. C. "A Study of the Manufacture of Water-Ices and Sherbets." New York State Agr. Exp. Sta. Bull. No. 536.

Honey Butter.

Honey, blended with butter, has been put on the market in a limited way in some parts of the United States under the name of "Honey-Butter." About two years ago patents were taken out by a firm in Los Angeles on such a product, which contained in the neighborhood of 40 per cent honey and 60 per cent butter, and stiffened with gelatine or fruit pectin. Honey Butter is essentially a spread for toast or bread, but no doubt might be used in various other ways.

The Dairy Department of the Ontario Agricultural College commenced some experimental work on this product last year.

The most satisfactory method of blending the honey and butter found up to the present time, has been to melt the butter to a creamy consistency, then add finely granulated honey and mix the two in a Hobart. This gave a product with a very desirable, smooth texture.

Samples of Honey Butter were thus prepared using 5, 10, 15, 20 and 40 per cent butter with and without added fruit pectin. These different samples were compared for flavor and texture, by various members of the Dairy Staff, Apiculture Staff, and Ontario Honey Producers' Co-Operative, Ltd. The samples containing 10 to 15 per cent butter met with the most favor. The samples without pectin had good texture and seemed to have sufficient body to withstand the temperature requirements, so that the use of stabilizer was discontinued.

Samples of the various lots were held at room temperature and also at 40° F. to 45° F. to observe their keeping quality. About four days after their preparation, the samples developed a rancid odor and taste. It was thought that the presence of fat splitting enzymes in the honey might be responsible for this rapid deterioration. Consequently, further samples were prepared using heat treated honey. The honey was heated to 190° F. in a water bath, and after cooling to 60° F. was inoculated with a desirable small crystal starter and held at 40° F. till crystallized.

Samples prepared using this specially treated honey exhibited much better keeping quality, some of them remaining in good condition for a period of one month.

More experimental work will be necessary to arrive at the most desirable processing temperatures to ensure a product with satisfactory keeping quality.

Honey Chocolate.

We have had the opportunity of trying this product in our department as a flavor for chocolate milk and chocolate ice cream. It is only fair to state at the outset that the product submitted to us was in the experimental stages.

The honey chocolate mixture contains about 65 per cent dark amber honey, and 35 per cent of chocolate. The object in using the dark grade of honey is no doubt to make an outlet for this grade, which is not very popular as a table honey.

A few trials were made using this product to flavor milk for beverage purposes, and ice cream, in comparison with a chocolate syrup made up with cocoa and sugar and water. Comparative samples were given to students to taste and criticize. They were not informed of the source

of the chocolate flavor. The commonest objection taken to the samples flavored with the honey chocolate was that they had a rather sharp, bitter flavor. Whether this was due to the grade of honey used or the chocolate was not determined. As a flavor for ice cream it is too expensive, as the cost of flavoring a batch of chocolate ice cream was twice as great with honey chocolate as with the chocolate syrup as ordinarily prepared.

Modifications in the grade of honey, the relative percentage of honey and chocolate and the grade of chocolate might overcome these objections and provide a product which would be quite acceptable for the above purposes.

Honey in Milk Drinks.

Lucas mentions the use of honey in milk drinks, and suggests the following formula. To each 16 ounces of milk add 3 ounces of honey, and 15 drops of orange or lemon extract, or seven drops of each. Agitate in a shaker, or with a whip until the honey is dissolved. Color a lemon shade, chill and serve. This may be varied in a great many ways by changing the flavoring material.

These milk drinks are intended more for home use of course but should prove popular at soda fountains.

It would seem from a review of the available facts on the use of honey by the dairy industry that it should prove a very good sales outlet for honey. Some time and considerable thought will no doubt be necessary in order to solve problems still existing in the successful manufacture and marketing of some of these products, but solutions will be found, and the results should be of benefit to both the honey producer and the dairy industry.

Dairy products and honey are excellent foods and they should lose none of their popularity by combining them.

ENJOYING BIZ AND BEES. CAN WE DO BOTH?*

(Dr. William C. Wilson, St. Charles, Missouri.)

This is not for him who has a bee business, but rather for the busy business man who has or ought to have bees as a side line. He may ask at the outset "Does it pay? By attending more strictly to my biz I can make more cash and thus buy my honey cheaper than I can produce it."

Can a very busy man afford to keep bees? Will it interfere with his success by consuming too much time?

What is Success?

Can you rightfully measure a man's success by the volume of his biz or by his tax receipt? No. And without presenting any arguments here I wish to make the assertion that to be really successful every busy man has or needs a hobby. If he has none he is in danger. Is it not noticably true that every really successful elderly man of your acquaintance has ridden a hobby or several of them, one at a time, one that has helped to keep his mind active?

A man's home life is more important than his biz. If he has a home, a man's health and disposition when growing old and dependent is more important than wealth. Too many good men are money makers, and are fine in the office, but are far from being fine home-makers. Some even allow themselves to become a grouchy old nuisance at home and lay it all to "business worries." This is exactly what I am shooting at. This is what we all wish to prevent if we can and here is where the bees come into the picture to help.

Surely you can keep yourself from becoming a grouchy old nuisance around the home. Now is the time to begin. You can put the word "for" in place of that mean little word "if"; and *you* are the only one that can *do it*. "You are the job for you."

Business worry is a very poor excuse around the home. Business worries should not be carried into the home. They must be eclipsed, overshadowed, covered up, or driven clear out of your system temporarily by something very interesting around the home. That something is your hobby. This hobby might be fancy poultry, rabbits, flowers, high pressure gardening, golf, boating, tennis, etc.

We may come from the office all tired out, mentally, but we are seldom too tired to do the things we really enjoy doing. We really enjoy doing the things we are expert at doing. We do or should get a real thrill, a kick out of being the real master of the situation, out of being a real expert, a recognized authority in something, if it be only

* Paper presented at Annual Meeting of Illinois State Beekeepers' Association, Springfield, Illinois, November 17, 1931.

in making a better mouse trap, shaking bees from combs, or using an uncapping knife. This satisfaction is not egotism either.

It seems to me that by far the most practical and successful hobby is some form of nature study—bees, birds, blossoms, pets. You cannot get the thrills, satisfaction, relaxation, rest, and mental stimulus that a true hobby affords from movies, dances, cards, tobacco, fiction, guns, and such man-made devices. *They do not satisfy.*

The science of beekeeping is perhaps more easily learned than any other and it is as nearly a science as some other so-called sciences. In other words, if you are well posted in beeculture, in love with the bees, you will find time to work among them, to read, and to talk bees. This work will be restful not drudgery, a pleasure not a duty, a hobby in which you are not expected to make pay in dollars and cents. Most hobbies do not.

Bees and an intensive study of apiculture is an intensely interesting, practical, and even remunerative line of nature study. Is it not one of the most wonderful pages in the whole realm of Nature?

Is it not true that the ideal, old school bee man is congenial, unselfish, liberal minded, open hearted and withall a good fellow to mix with? And why? The bee man or the bee woman must keep mentally alert, must exercise his memory and ingenuity, must be very observant and have quick decision, or he will soon drop out. The bee inspector has the pleasure of mixing with that sort of people.

Consciously or unconsciously such a study of Nature shoves a fellow right up against the wonders, the wisdom and unsearchable riches of Nature's God. And there is a response, or there should be, that counts in our makeup.

One of the most impressive lessons in all apiculture is the utter helplessness and worthlessness of just one isolated bee. Shut a bee away from its colony and all it can do is buzz and bluff a bit, sting and die. So it is with the selfish, isolated man—the man who does not acknowledge his duty to God and man and his utter dependence upon them. He will only bluff around a bit, sting his community and soon drop out of the picture. And who cares?

I may be biased but I think it hard if not impossible to find in any other field of endeavor a group of men that will measure up to the all round high standard of excellence as was found in Dr. C. C. Miller, A. I. Root, the senior Dadant, G. M. Doolittle, E. W. Alexander, J. E. Crane, and others of that old school of beekeepers. T. B. Terry, John Burroughs, Edison, Isaac Walton, and Audubon were ardent lovers of Nature.

The busier the business man the greater the danger of: (1) physical breakdown, loosing health and biz; (2) becoming calloused and selfish in biz, part of cold heartless corporation; (3) biz may eclipse home and social duties and he becomes narrow, uninteresting, tiresome, if not grouchy.

Yes, the busier the man the greater his need of a real absorbing hobby and to this man we can highly recommend beekeeping as a safety valve.

He may be a captain of industry and have no time nor interest in such little things. But wait a minute. In a colony of bees he finds action galore and all working in beautiful harmony and unity of purpose. He can open a hive, a miniature factory, in which are some 50,000 well organized workers and with caution and a little smoke to help establish his authority he is verily "master of all he surveys." He is straw-boss, foreman, superintendent, principal, business manager, president, dictator, yes, absolute monarch over this army of bees. And he is the sole owner of the factory and its output of the oldest, best, and most wholesome sweet on earth.

Each of these 50,000 little workers in each hive or colony, is ambitious to help make his honey and wax factory a success. He must remember that these workers carry concealed weapons day and night so he must be onto his job. Thrills? Yes. A recent magazine article stated that the speaker had an army of six million such workers under his thumb. This is not hot air; I have them and thrills galore.

His mind must continue active, but in a very different field. The normal mind does not rest by being idle. A change in field or action is its rest. Forgetting worry is rest. Satisfaction is rest. Harmony is rest to the busy, tired mind.

To the busy man we can conscientiously say: Work the bees with your own hands. Propolis stains are honorable. Get really tired. Muscle fatigue promotes mental rest. Be proud of tan and sunburns, and blistered hands gotten in the bee yard. If you get stung:

"Be proud of your swollen eye,
It's not the fact that you are licked that counts,
It's how did you fight? And why?"

Every time you get stung you will learn something, about sting-prevention at least, and stings may be a good tonic for tired nerves. I don't know.

Read bee literature until you are loaded. Be able to talk intelligently about bees and you can interest and entertain almost any group of people. You need never apologize for being an ardent bee lover. "All the world loves a lover." The harmony in the hive, the sweet in the honey and the communing with Nature helps to keep us from souring on the world.

And to each of you may I say begin right now to take good care of that fine, interesting, lovable old man you hope to become some day. Begin now to train him. Don't let him begin to get gloomy and grouchy, lazy and dyspeptic, narrow and selfish. Don't become a one track man, a harp with one string. "You are the job for you."

The business man may retire, close his ledger, and live comfortably on the earnings of past endeavors and successes. Well and good for the physical man but not so for the mind. Remember, the unused mind will deteriorate.

We are old when we get to the point or the habit of living in the past more than in the future, be we 40 years old or 80. The mind must never get to the end of the row or retire. Never quit building air-castles. And Nature study has no end, no finis. Apiculture is one of the very best pages in the book of Nature.

Another entirely different reason why bee culture is an exceptionally attractive hobby, and a very real reason, is in the health value of honey. The bee lover will become a honey eater and more honey and less sugar always spells better health and "there is a reason" but that is another story.

If you cannot keep bees and enjoy them, take up some other line of Nature study. You might easily become the best authority in your county on some branch of Nature study, be it chrysanthemums, dahlias, carnations, roses, pansies, rock gardens, lily pools, gold fish, guppies, canaries, bird life, fungi, butterflies, beetles, botany, fruit, plant breeding, nuts. There is no end to the "book of Nature."

I am not sure but that the busy, plodding housewife needs a hobby and is in as much danger as the busy business man. Don't let yourself begin to get crabbed, morose, selfish, lop-sided, worthless, childish. Begin now to take good care of that fine, fine old man, old lady, that you wish to become some day. Grow old gracefully. "You are the job for you."

THE HONEYBEE'S SPAN OF LIFE.*

(V. G. Milum, Champaign, Illinois.)

One of the most interesting facts regarding the honeybee colony and its organization is that the queen has voluntary control over the laying of two kinds of eggs, fertilized and unfertilized. The unfertilized eggs develop into males or the drones and the fertilized eggs result in females, either workers or queens dependent upon the kind of food given to the developing larvae.

The queen bee in the process of egg laying inspects each individual cell by inserting her head, then withdrawing it, moves slightly forward over the cell inspected and the next two adjacent, grasps the edges of these cells with her feet and arches the abdomen to insert its tip into the cell to deposit the single egg. The writer has observed a queen with an unusually long abdomen that often made a mistake in judging the position of the cell examined with the result that the egg was deposited in a different cell, which fact could account for the occurrence of more than one egg per cell with otherwise apparently normal queens. Sometimes when young queens first start to lay, they deposit more than one egg per cell but this seems to be due to an improper functioning of the ovipositor for the eggs are often attached end to end.

The normal egg is deposited on the back wall or base of the cell and projects horizontally toward the opening when first laid. By the time the egg is ready to hatch, in varying lengths of time near 72 hours dependent upon the temperature, the egg has gradually assumed a vertical position in contact with the base of the cell throughout its length. The changes taking place within the egg during this period are well described by Nelson (18).

According to Bertholf (1) the egg can not be completely hatched and the larvae separated from the chorion or covering of the egg until the bees put the first larval food into the cell. Lineburg (12a) also concludes "that the placing of larval food in the cell with the egg is necessary for the normal hatching of the larvae of the honeybee."

The older nurse bees thus assist the young larvae by placing a supply of royal jelly on the base of the cell so that the larva literally floats in this liquid like food. This type of feeding continues into the third day near the end of which the larva has grown until it fills the bottom of the cell and then must assume a slightly spiral position with its head slightly nearer the opening of the cell than is its caudal extremity.

It is also near the beginning of the third day that the kind of food is apparently changed. According to von Planta (22), the worker larva is fed royal jelly only up to this point, after which the royal jelly is

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mixed with honey, but Phillips (21) reports that "pollen grains are found in the mid-intestine of older worker larvae." The queen larva is fed entirely on royal jelly, this generally being agreed as the controlling factor for the difference in development of workers and queens. However, queen breeders who use the grafting method prefer to use larvae from 12 to 24 hours old. One queen breeder has stated that queens can be reared from larvae four days old but that they are never of very good quality.

Nelson, Sturtevant, and Lineburg (19), intimate that the usual method of feeding for the older larvae is directly to the larval mouth since no significant amount of food is ever found on the base or sides of a cell of an older larva. They suggest a possibility of reciprocal feeding or trophallaxis, with the larva giving up some material to the nurse bee, as described by Wheeler for ants and Roubaud for certain wasps.

King (10) refutes this possibility of reciprocal feeding, for after watching the feeding of larvae of all ages in a cross sectional hive, he says that the attendants never were observed to place the food directly into the mouth of any larva. According to King, the placing of the food seems to be at random for often he observed it being placed as near the caudal end as to the head of the larva. The larva then obtains its food by slowly twisting its head about to make contact with it. King also indicated that workers may remain in cells for intervals of several minutes without even feeding the larvae therein.

However and whatever the larva is fed, the food is at least highly nourishing for someone of our good beekeeping friends with a mathematical mind has computed that if a human baby at birth could be fed as stimulating a food for five and one-half days, a human youngster weighing twelve tons would be the result. In order for the larva to increase in size so much and so rapidly it is necessary for it to shed its skin four times during this feeding or uncapped period of its life. Finally the larva is capped over by the nurse bees after which the remaining food is consumed.

During the larval feeding period the hind gut or intestine has not been connected with the ventriculus or stomach but now the connection is made with the ventriculus and the Malpighian tubules and their accumulated waste materials are discharged at the back or lower base of the cell. Portions of the four cast off larval skins may be found included in this mass.

The full grown larva now turns lengthwise in the cell and proceeds to spin its cocoon which in the case of the worker and drone entirely surround the inside of the cell but with the queen does not cover the base where it would come in contact with the surplus of royal jelly usually found in queen cells. This latter fact seems to be significant for the young virgin queen or queens assisted by the workers usually tear the base of the cell when they attempt to destroy the rival developing queens.

The cocoon is produced from silk secreted by glands opening in the head on the end of the mentum of the mouthpart and is at first somewhat fluid in nature, but if we examine a completed cocoon under the

microscope no strands of silk are visible, indicating that this fluid-like secretion has fused to form a parchment-like cocoon. Whether the cocoon entirely excludes the cast off larval skins and excrement deposited in the base of the cell is questioned by Snodgrass (27), but most of this mass seems to be next to the cell wall or previous cocoon, all of which accumulate with each succeeding brood of larvae developed in a particular group of cells.

After the cocoon is spun, which according to most observations, requires about a day, the larva stretches lengthwise in the cell with its head toward the opening of the cell. The writer on two occasions has seen workers that made the mistake of assuming the opposite direction for their quiescent posture.

This is the point where the disease known as American foulbrood does its deadly work. Sturtevant (29) has demonstrated that the presence in the artificial culture medium of more than 3 or 4 per cent of reducing sugars usually inhibits the germination of the spores and growth of *Bacillus larvae,* the causative organism of American foulbrood. He says that during the period of mass feeding or the first two and one-half days of larval growth there is little chance for infection since the larval food is a glandular secretion without liability of being mixed with infected honey.

After the change to individual feeding the presence of reducing sugars is increased to nearly 14 per cent, and this condition maintains until after the larva has stopped feeding. By the time the cocoon has been spun and the larva stretched lengthwise of the cell, the bacteria or spores of *Bacillus larvae* have had a chance to germinate and reproduce and thus causes the death of the larva in its characteristic position, stretched lengthwise in the cell.

In a normal larva in the quiescent stage rapid changes within its body are continuing to mold the larva into the image of the adult, the pupa, which is disclosed by the molting or shedding of the fifth and last larval skin. According to Berthoff, (1) this change on the average, occurs on the eleventh day for the worker, the tenth for the queen and the fourteenth for the drone.

During the latter part of the prepupal period (from capping of larva to last molt) an examination of the larva will disclose an accumulation of somewhat clear molting fluid near the head end of the insect with the appendages of the body rapidly taking shape. A detailed description of the changes occurring in the development of the appendages is given by Snodgrass (27) and more recently in much detail by Oertel (20) to which accounts those interested are referred.

After the pupa is disclosed by the last larval molt, the most practical fact that a beekeeper can easily see during this pupal period or stage by uncapping the brood cell is the pink-eyed pupa which represents about the fourteenth day of development. After this the color of the compound eyes gradually changes to purple and finally to brown along with the deepening of the body color. Before the bee can start to emerge as an adult, the pupa must also molt or shed its skin, this occurring on the day previous to emergence, whereupon the young bee starts to gnaw its way out of the cell.

The time required for development of the honeybee through these various stages is generally given in recent literature as 21 days for the worker, 16 days for the queen and 24 days for the drone. However, these are apparently only near average conditions for temperature seems to be a very definite factor which limits the time required. There is an enormous amount of literature upon this subject relating to other insects showing that at higher temperatures less time is required and a greater period at reduced temperatures. The writer has previously attempted to compile and review all of this literature relating to the development of the honeybee in an article (16) appearing in the Twenty-ninth Annual Report of the Illinois State Beekeepers' Association which cites the particular references.

Time and space does not permit inclusion of all of these references, hence only a few will be mentioned. The earliest found was that of Pliny who gave forty-five days for the worker but Butler in 1623, listed a variable period of 21 to 30 days, depending upon the weather. Other writers, including Swammerdam in 1758, continued to express a weather or temperature relation, but only with the writings of Francois Huber did we get our modern table of development in almost exact duplication, except that 20 days was allowed for the worker. In 1827, Bevan adopted 21 days as also Taylor in 1839, but a few years later the figure 20 established itself in bee literature until near the close of the Civil War when 21 days asserted itself and with few exceptions since then has been the figure given. In the case of the queen the figure generally varies between 15 and 16 days.

The first volume of the American Bee Journal published in 1861 gives ideas expressed by Berlepsch showing that, depending on extremes of conditions and race of bees, the time for complete development may vary from 15 to 22 days for the queens, 19 to 26 for the worker and 24 to 28 for the drone.

The author (13-16) in studies made at the Wisconsin Experiment Station found that temperatures up to 91 to 92° F. were apparently necessary to stimulate the colony to broodrearing but temperatures as low as 76.3° F. apparently had no other effect than retarded development. Thus, lower temperatures in the brood nest during the early spring period and on the outer frames and edges of the brood area increased the developmental period. Worker brood in some cases was found to be capped in less than eight days, the majority during the ninth day, and some requiring as much as eleven days. In this series of experiments the complete developmental period for workers varied from less than nineteen and seven-eights days to more than twenty-four days.

In one set of experiments, 74.6 per cent emerged in a total possible maximum time of less than 21¼ days, while in another case 93.46 per cent emerged in less than 21 days or an average of 20½ days for this latter group. At higher temperatures all bees in some frames emerged in less than 21 days while at colder temperatures all bees in certain particular frames required more than 21 days for complete emergence of all adults. These facts would seem to suggest that colonies should be provided with sufficient protection during the early spring broodrearing period in order that a uniformly high temperature may be main-

tained within the brood nest for the most economical use of the brood-rearing space in the production of useful worker bees.

On the other hand does speeding up the developmental period decrease the period of adult life for the worker? There are arguments for both sides of this question which might very well bear further investigation with the possibility of gaining valuable information.

Now that we have traced the honeybee through the various stages of its development, what are its duties and fate in adult life? There are no doubt earlier references but Donhoff (4) in 1855 reported that experimental bees were nineteen days old before flying to the field.

In 1882, Wiltse (30) gave the results reached by making up a colony from only capped brood frames. He found the bees working in the hive on the second day after hatching, on the third day they collected honey into comb-cells, commenced queen-cells when queenless, removed dead bees, flew from hive, and fanned at entrance. On the fourth day they left the hive to collect moisture, while on the fifth day they were strong enough to fly away with dead bees. They gathered honey on the sixth day, first made comb on the eighth day, and first collected propolis on the eleventh day.

Doolittle (5, 6) in 1888 and 1905 reported bees flying from a normal colony to gather honey and pollen at sixteen days with play flights as early as the sixth day. In colonies lacking field bees, Doolittle said that bees could be forced to go to the field for pollen and honey as early as the fourth to sixth day, or older field bees might do some hive duties in case of shortage of young bees.

Various writers since these early dates, including Cook (2) Langstroth and Dadant (12), Greiner (9), Nelson (17) and others have reported practically similar results for normal and abnormal colonies.

F. C. Nelson (17) working at the University of Illinois in 1924-1925 made some interesting observations on the activities and duties of adult bees. He noted that recently emerged bees or while still gnawing at their cell cappings gave off a clear liquid to from one to three older bees, the new bee in turn taking food from other bees, with exception of two bees which fed first from a cell. Nelson did not determine the nature of this material, but we know of no one else having even reported this activity of young bees.

Working with marked bees of known definite age in a colony containing bees of all ages, Nelson found that the first and second days of adult life were taken up with taking food, cleaning themselves, remaining quiet and motionless on the combs and some resting in cells but not feeding larvae. On the third day, he observed polishing of cells, attending queen, evaporating nectar by exuding with mouthparts, feeding and capping larvae, and capping honey. The first play flights occurred when the oldest bees were four days and two hours old. Marked bees were found doing all types of labor from three to twelve days with shifting from one job to another as occasion demanded. Wax secretion was not detected by Nelson until workers were eight to nine days old with no field work up to twelve days in a normal colony.

According to Nolan, Rosch (23) states that the first three weeks of adult life is occupied in hive duties and the remainder in field duties with five weeks as the average duration of a worker's life during the

busiest period. Of the hive period of adult life, Rosch assigns the first three days to cleaning out cells for queen to lay in, after cleaning body and getting food from other bees. He states that licking of the cells apparently left an odor for the queen since she passed over cells not so treated. Rosch stressed the fact that between cleaning spells, these young bees idled upon brood, thus helping to keep it warm.

The second period of hive duties according to Rosch consists of nursing larvae for 10 days, followed by a period of one week of varying hive duties such as guarding, stowing away pollen, carrying out debris, etc., with an excess for any one activity leading to other activities.

Rosch found that younger larvae were never fed by workers younger than five days, but were fed by older nurses who might also give some food to older larvae. He also observed that orientation flights may begin in the latter part of nursing period which may extend beyond thirteen days or be shortened in case of a heavy honey flow since he found that the last period of hive duties begins by relieving incoming nectar gatherers of load and storing it as well as packing pollen although the field bee deposits its own load of pollen. Guarding is given as one of the last hive duties before field duties in which Rosch found no definite sequence.

Histological studies made by Rosch on the pharyngeal glands which are generally agreed to secrete royal jelly showed that they are not completely developed until 3 to 6 days after emergence, with degeneration under way by the 15th day.

King (10) in studies made at the University of Illinois and reported in his thesis presented in 1928, gives the results of extensive observations of hive duties and the results of much histological study of the five larger gland systems of the honeybee. He made micro-photographs of microtone sections of the mandibular, pharyngeal, postcerebral, thoracic, and wax glands of bees of various ages up to 42 days, thus being able to arrange a series showing the glands of different aged bees and the development of each gland comparatively with the other glands of the same bee.

King pointed out that the period of greatest activity of the mandibular glands is closely correlated with that of the pharyngeal glands. The earliest age of highest development of either he gives as the fourth day and the latest age for individual bees as 14 and 18 days, respectively, for mandibular and pharyngeal. The earliest age at which decline occurs, King found to be the ninth day, with the general age of decline for all being the fifteenth and nineteenth days, respectively.

For the postcerebral and thoracic glands or the salivary glands, King gave 12 and 10 days, respectively for the earliest age of highest development, and 27 and 19 for latest age of highest development. The earliest age at which decline occurred he listed as 12 and 11 days, respectively, with the general age of decline for nearly all individuals at 27 and 23 days, respectively.

Dreyling (7) reported on observations of wax glands in 1903 and 1905, showing that the wax glands are not fully developed in just emerged bees, later elongating, and then decreasing and degenerating as the bee ages.

For the wax glands, King found the earliest age of highest development at nine days, the latest age at 19 days, the earliest age of decline at 11 days, and the general age of decline at 20 days.

In a 1930 publication (25), Rosch gives in much detail the results of research on the age of wax building bees. In this he shows that the normal wax building age is from 12 to 18 days of age with extremes as late as the twenty-sixth day. He supports his statements by figures and measurements of the wax glands.

It is likely that King's observations and conclusions will be made available soon but a study of these limits of highest development and decline seems to indicate that the mandibular and pharyngeal glands are at least functional during the period of general hive activity in a normal colony and especially in the first two weeks, excepting the first three days. On the same basis the wax glands are most active during the second week, while the salivary glands seem to be developed for some special duty outside the hive since their highest development was not reached in any case until the tenth day and the latest age at twenty-seven days. These seem to fit in very well with the generally observed activities of bees of various ages.

Having indicated some of the series of duties of adult worker life which are apparently correlated with the development of certain gland systems related to those activities the question arises as to how long a worker bee really lives. The period of adult life of the worker bee is an important one from the practical standpoint of manipulation and care of colonies. Again it will be impossible to relate all of the references to this question, but Langstroth (11) in 1853 stated that this period was not longer than two to three months while in the 1919 revision of his book (12), the average life of the worker is given as 35 days (½ of 90-21) after assuming that there are no black bees left in a black colony at the end of three months after requeening with an Italian queen.

In 1888 and 1905, Doolittle (5, 6) stated that all the black bees are gone in 45 days after requeening, but in 1891, France (8) experimenting with Carniolans had old bees still secreting wax and building comb after 90 days, but admitted possibility of drifting. It is possible that the length of adult life of workers may be in part dependent upon the race of bees.

Spiller (28) in 1928 says, "If a new queen is introduced in the summertime to a hive, in seven to eight weeks the whole of the population will be the offspring of the new queen." Deducting the 21 days of the developmental period he concludes that the average period of adult worker life is only 4 to 5 weeks.

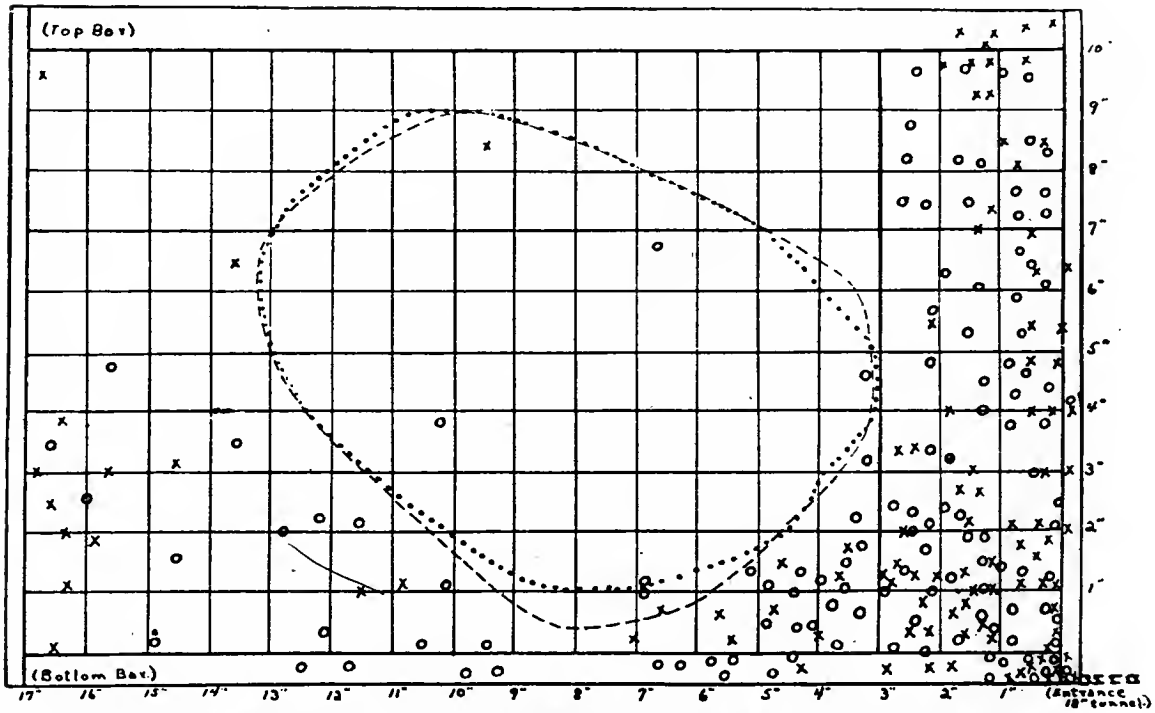
The adult worker period is usually given as six to eight weeks during the active summer season, although Demuth (3) states that during the winter months workers may live as long as six to eight months or even more. Apparently there is some means of slowing up life activities as winter approaches. In general, it is agreed that length of life is chiefly dependent upon the amount of individual activity, except in cases of accidental death. Phillips (21) has suggested that death may be due to loss of excretory function in the eonocytes in fat bodies or to the destruction of nerve cells that cannot be rebuilt.

In 1928, the author of this paper had occasion to introduce Carniolan queens into each of three nuclei consisting of three frames of mostly sealed brood with some larvae and eggs. While no exact counts were made of the number of bees, a very conservative estimate would be 20,000 Italians. This was on July 9, and on August 31 or 7½ weeks later, the remaining Italian bees were counted. The numbers for the three hives were 509, 229 and 19, respectively, and it is likely that these remaining workers were in early developmental periods on the date of introducing the Carniolan queen.

The writer has since gathered some further data on this point but also noticed a rather interesting fact in regard to the segregation or location of the older bees in an observation hive. Not as an experiment, but in the establishment of observation hives in the beekeeping classroom at the University of Illinois, on July 21, 1930, a nucleus was made up, consisting of a frame of Italian brood (approximately 2,000 cells), and a frame of Carniolan bees and queen.

Having observed the interesting location of the Italian bees, their location in the still well populated hive (Colony E) was plotted at 10:15 p. m., September 8, or seven weeks after the establishment of the colony.

Chart 1.



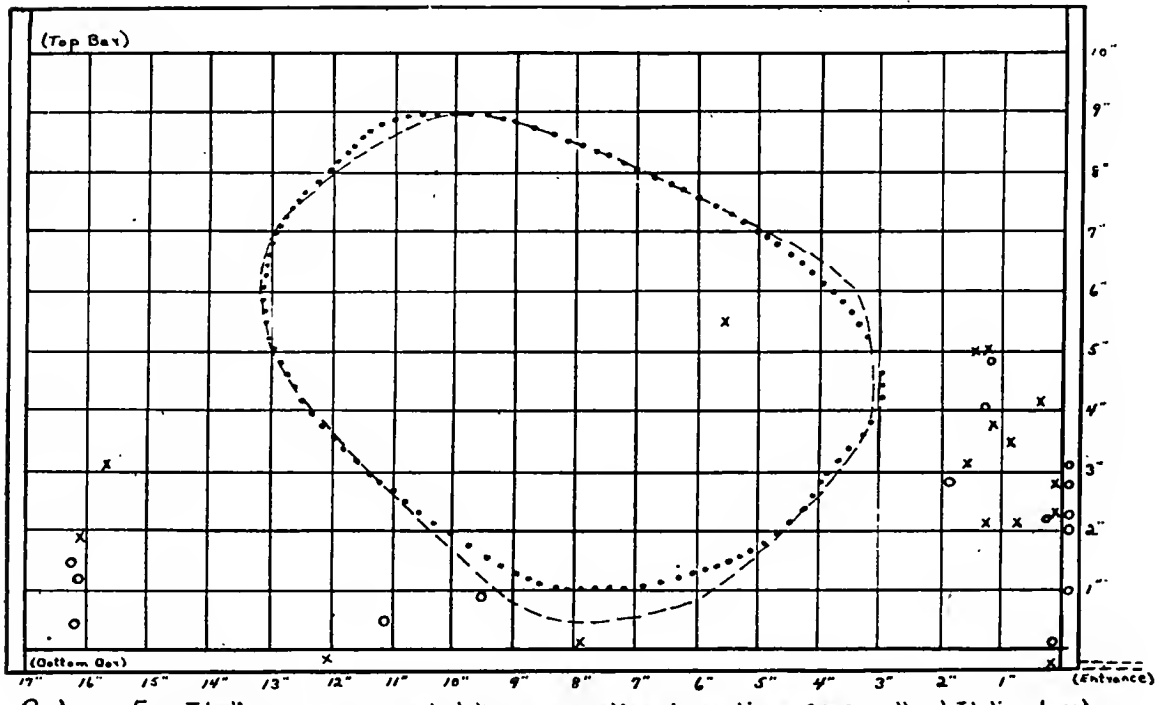
Colony E – Italian workers seven weeks after inserting 2000+ cells of Italian brood.
Date – 10-15-10:45 PM, Sept. 8, 1930. x=Italians – R. side (107); o=L. side (121); in tunnel (5); total = 230.
3500 cells of brood: (····) R. side; (– – –) L. side. Carniolan workers = 2170.
(July 21, 1930 – Nucleus of Carniolan queen and workers and all stages of Italian brood.

The location of the remaining Italian bees, 230 in number, are shown in Chart 1. The area of the frame is plotted in one inch squares. The Italian bees on the right side are indicated by an (x) while those on the left are designated by an (o), the tunnel entrance being at the lower right hand corner. The area of the brood nest on the right and

left sides, respectively, is represented by the large circles made up by a dotted line (....) and broken or dash line (- - - -).

The fact, that of the original 2,000 cells of brood in various stages of development, there were only 230 adult Italians remaining in a well populated colony is certainly significant and confirms previous observations cited. But the location of these older bees was of more interest. An examination of the chart or records shows that nearly all the Italians were congregated near the entrance, with a few scattered in the lower back area of the hive. Three Italians, well within the brood area seemed to have the appearance of younger bees which could have drifted from two neighboring hives with entrances at a distance of four feet, although the amount of drifting was very small.

Chart 2.



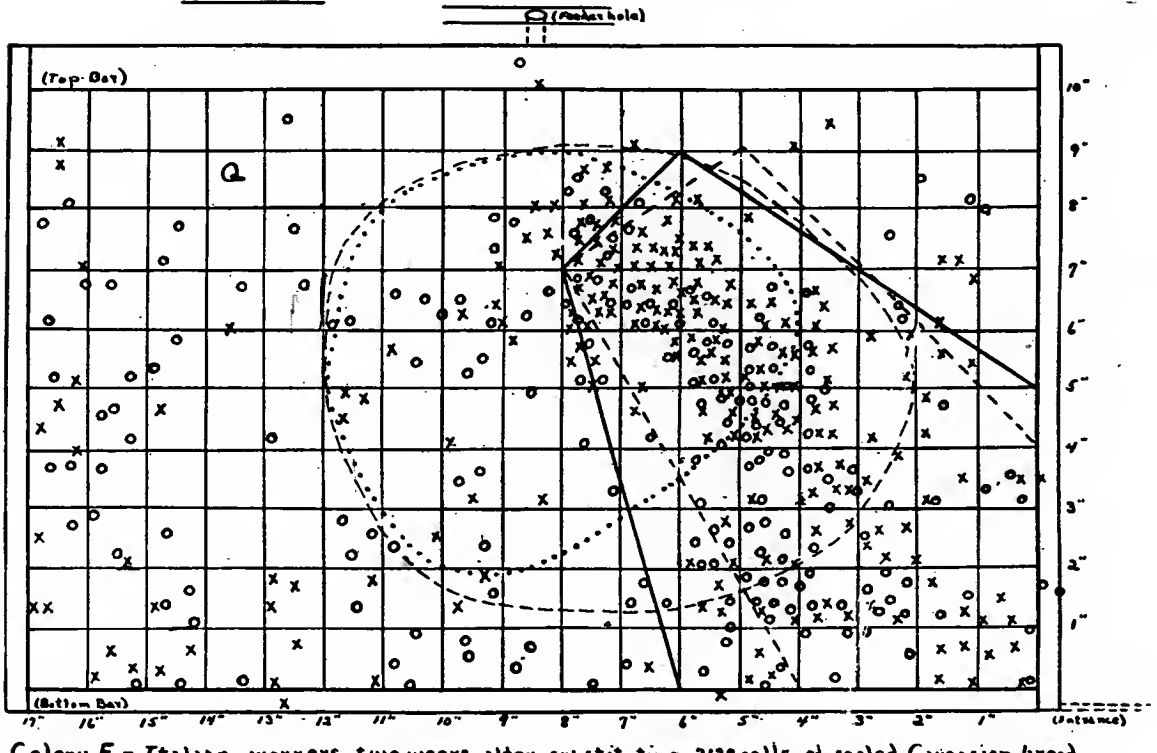
Colony E - Italian workers eight weeks after inserting 2000+ cells of Italian brood.
Date - 8:30 PM, Sept. 15, 19, 1930 x=Italians-R. side (16); o-L. side (14); Total=30 Italians.
3500 cells of Carniolan brood: (- - - -) R. side; (— — —) L. side. 2367 adult Carniolans.
9/16/30=8 Italians. 9/22/30-7 weeks-4 Italians. 10/10/30-1 Italian (drifter?).

The observation just cited was made at night when there was no flight to the field, but the same relative location of the old Italians was observed in the days following with the number rapidly decreasing until there were only 30 remaining at 8:30 p. m., September 15, or at the end of 8 weeks as shown by Chart 2. Again with the exception of a possible drifter, all were outside the brood area, mostly congregated near the entrance with a few along the bottom toward the back of the hive. At the time Chart 2 was plotted, 40 Carniolan workers were fanning in the entrance tunnel but there were no Italians among them. The number of Carniolans actually counted was 2,367, hence the rapid disappearance of the Italians could not be due to an abnormal condition so far as numbers of bees was concerned.

On the following day only 8 Italians could be located, while at the end of 9 weeks only 4 remained, and at 10 weeks only two solitary Italians remained of the original 2,000 sisters. It is quite likely, judging from the observations of these apparently longer surviving Italians that they were drifters since most of them were active in the brood area considerably beyond the period of the majority.

Having found this interesting set of conditions in Colony E, observations were made on another nucleus designated as Colony F. At 10:30 a. m., September 18, a frame containing 3,120 cells of Caucasian sealed brood was substituted in Colony F which was well populated with an estimated 2,500 to 2,000 yellow Italian bees and queen. All unsealed cells of Caucasian brood were removed and the oldest of this brood found by uncapping cells was in the pink-eyed pupal stage or around 14 days of age. This was further confirmed by the emergence of the first Caucasians on September 24. At least 90 cells of the Caucasian brood around the edges was removed by the bees and there was no further brood rearing during the fall period.

Chart 3.



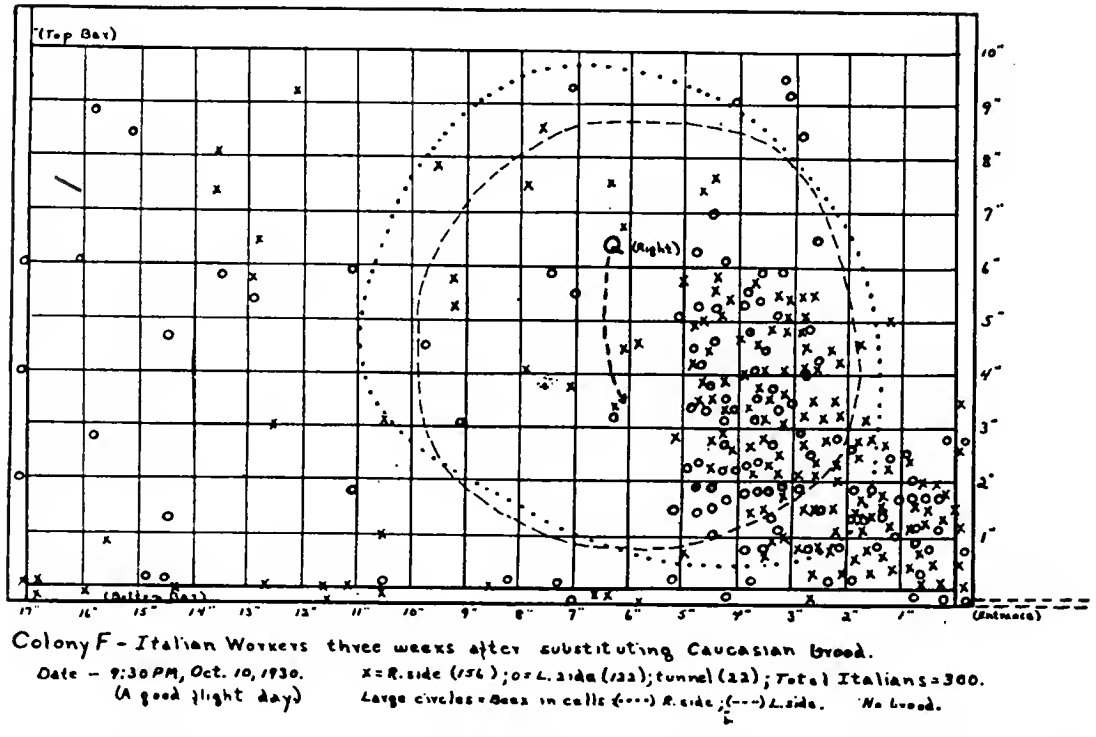
Colony F - Italian workers two weeks after substituting 3120 cells of sealed Caucasian brood.
11:00-11:45 PM, Oct. 3, 1930. X = R. side (220); o = L. side (198); none in tunnel; Total = 418 Italians.
No brood visible. Large circles = Bees in cells: (---) Right side; (---) L. side. Room Temp. 76° F.
Location of Italians, 9:30 AM, Oct. 6: Majority in — solid line cone - right side; - - - Left side.

At 9:00 p. m., September 26, or 8½ days after the Caucasian brood substitution, observation showed that the workers hovering over the brood area were practically all Caucasians, with the Italians around the edges and 32 in the tunnel. On the night of October 3, or only two weeks after the substitution of brood, the location of the Italian bees was plotted as shown in Chart 3 similiar to the methods used in Chart 1 and 2 of Colony E. At this time, there was apparently no brood-

rearing but the bees were occupying the majority of the cells in the area indicated by the broken (- - - -) and dotted (. . . .) lines.

Only those Italians outside of the cells were plotted in Chart 3 but of the 418 Italians thus visible, there was apparent at the end of two weeks, a congregating or segregation of these older bees. At this time the greater number seemed to be in the area diagonally back and upward from the entrance to the feeder hole, the latter of which may have had some significance. Within this dense grouping of Italians there were practically no Caucasians visible. That his grouping was not accidental or dependent upon the time of day is shown by the location of the Italian bees three days later at 9:30 a. m., on October 6, as indicated by the two cones imposed on the original plotting of Colony F in Chart 3.

Chart 4.



Colony F - Italian Workers three weeks after substituting Caucasian brood.
Date - 9:30 PM, Oct. 10, 1930. (A good flight day)
x = R. side (156); o = L. side (122); tunnel (22); Total Italians = 300.
Large circles = Bees in cells (- - -) R. side; (- - -) L. side. No brood.

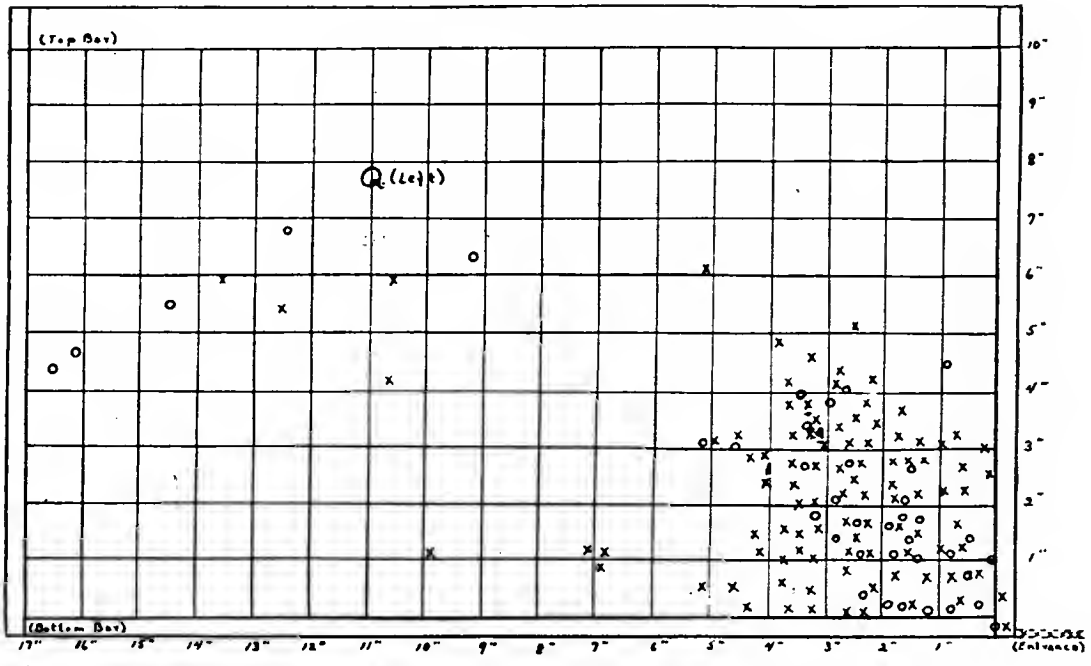
At 9:30 p. m., October 10, or three weeks after cutting off the supply of emerging Italians, their location was again plotted as shown in Chart 4. This was after a day on which the bees took a good flight. Only 300 visible Italians remained and these were mostly congregated on the frame near the front with 31 Italians and only 4 Carniolans still in the entrance tunnel. All but 14 of the Italians in the tunnel had returned to the frame before the plotting was completed.

At 9:30 p. m., October 11, 9:00 a. m., October 14, and 3:15 p. m., October 15, the remaining Italians occupied the same approximate position as shown on October 10 in Chart 4 and as at 2:30 p. m., October 16, as shown in Chart 5. On October 15 a total of 193 Italian bees were counted while on October 16 only 141 Italians were plotted, this date being only 4 weeks after the substitution of the Caucasian brood.

On October 23, at 5 weeks, there were only 10 Italians. At 6 weeks there were 5 still alive with the other 5 dead in the tunnel, but

in the meantime two young drifters had joined the colony. On November 14, the number of Italians had increased to 32 by drifting during cloudy weather in which there was some flight. But for all practical consideration, on the basis of 2,000 Italians originally in the colony at the time of the Caucasian brood substitution, nearly 93 per cent had disappeared within four weeks' time. This data would seem to more than confirm the oft-expressed idea that bees only live 6 to 8 weeks during the busy season. We can even reduce these limits by another two weeks and say that 4 to 6 weeks or 5 weeks is the average of a worker bee's life during the active season, thus confirming the opinions expressed by Spiller in 1928 that bees live only 4-5 weeks during the active season.

Chart 5.



Colony F – Italian workers four weeks after substituting Caucasian brood
Date – 2:30 PM, Oct. 16, 1930. Semi-cloudy, slight flight. No brood 2100 adults.
x = R. side (97) ; o = L side (38) ; (6) in tunnel ; total = 141 Italians (3:15 PM, Oct. 15 • 193)
5 weeks = 10 Italians 6 weeks = 5 7 weeks = 5

But the segregation and congregation of the older bees near the entrance may have much practical significance if it can be properly interpreted. Why do they take up this position? They are not within the brood area, perhaps because the younger bees persist in their duties of feeding and caring for the brood. This, however, would not prevent an occasional loafer from occupying such a position.

Park and others have shown that normally the nectar gatherer delivers its load of nectar to a hive bee but pollen carriers deposit their own load. Hence they are taken to various points back of the entrance.

It might be suggested that perhaps these older bees are hovering near the entrance to be ready to take their flights to the field when opportunity presents. Yet the same relative location is maintained during daylight and darkness, and before, during and after flight. On the other hand a smaller number are congregated outside the brood or main clustering area toward the back of the hive.

Lundie (12b) has demonstrated that less than 2 per cent of the bees of a colony die within the hive. He further computed that a bee's chance of dying outside the hive was 120 times greater than an inside or hive death. Are these older bees worn out physiologically or bodily and only waiting near the entrance until an inner urge or sensation causes them to take their death flight and then do they resign themselves to their fate and fly on and until exhausted?

A friend, Mr. M. D. Farrar of the Illinois Natural History Survey, has suggested that this reaction may have some temperature relation. Whether this is true has not been checked but the location of the bees along the diagonal line between the entrance and the feeder hole of Colony F as shown in Chart 3 might partly substantiate this.

If this phenomena is a temperature response, then there may be much practical application. For instance, the amount and type of ventilation given to a colony would influence the location of the older and hence practically worthless bees. This would be of significance in the production and shipping of package bees and the type of management of the hive would greatly influence the proportion of young and old bees in the package. It should also be of practical consideration in wintering and should greatly influence the amount and type of ventilation. If the old bees seek the edges of the cluster then those that chill on the edges during cold weather really are the old bee.

This congregating of the older field bees near the entrance which would often mean more crowded conditions in the brood nest, probably has a very definite relation to the swarming impulse. Mr. Demuth, in a personal interview, stated that swarming is seldom prevalent when the old bees are found in the supers but is very common when the old bees are clustered in the lower body near the entrance. Whether proper ventilation or some other manipulation will help to set up this more desirable condition of enticing the older bees into the supers is yet to be tested.

Perhaps someone can suggest some additional significance of these reactions for they appear to be fruitful ground for further investigations.

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THE QUEEN AND HER EQUIPMENT.*

(J. H. McCLURE, Murrayville, Illinois.)

Two years ago when the Annual came out, I complained to Mr. Milum that it contained nothing for the ordinary beekeeper. A year ago when the program came out it stated that a number of short talks would be given on topics of interest, better ways of doing things in the apiary. But when the annual came out nothing was there; when I chewed him up he pitifully pleaded that it simply was not done.

So he called for suggestions and I suggested that he work through the bulletin and further suggested "The yard man's notebook" and his action in that case reminded me of the time I went to church. The preacher took for his text, "Should a man compel thee to go a mile with him, go with him twain." He not only allowed the column but turned it over to me, which automatically throws its failure upon my shoulders.

When he invited me to come before the convention in interest of this line, I accepted in the hope that I might convince you that all the ordinary operations of a colony of bees were not perfectly worked out. I want to represent the class of beekeepers who need instructions and advice upon the subject of beekeeping itself.

I chose as a title to my subject, "The Queen and Her Equipment," because it is very flexible and can be made to cover a lot of territory. The difference between my subject and the ones to follow is that they will tell you what they know, while I am trying to tell you what I and thousands, perhaps, do not know.

A good place to begin to study the queen and her equipment is at the place where most people begin with the cluster. The only thing Dr. Miller said in his book, "Fifty Years Among the Bees," that I doubted in the least was: "I have no delight in swarms." The most interesting thing in beekeeping to most people is a prime swarm. Let us add in just the right place to hive conveniently. Now the first piece of equipment his queen needs is a keeper; if she gets one who knows why he needs a swarm of bees she is fortunate.

There are at least four distinct classes of beekeepers. First, the oldest and most particular and if he makes a success of it, the most efficient beekeeper is the man who produces comb honey. A queen to meet the requirements of this man has the hardest job of all. She must have a hive full of bees at all times, ready to build comb and gather nectar and at the same time be cramped for room in the brood chambers. Mr. Comb Honey Producer must have bees that build comb. But it must be white comb, all cells sealed white, all the same size and each section filled just right. She must be prolific and her daughters must be honey getters, wax producers and above all not swarm under any conditions. "Not so many questions in regard to temper or beauty."

* Paper presented at Forty-first Annual Convention of Illinois State Beekeepers' Association, Springfield, Illinois, November 17, 1931.

Number two is the man who runs for extracted honey. The most important thing with him is—Are they honey getters? It does not matter whether they are comb builders or not and for all he cares they may cap it with white oak bark. One more thing with this class of beekeepers is, it is believed that certain strains are inclined to rob worse than others. While no beekeeper cares for robbing it is a far greater menace to the extracting man than anybody else.

Third is the increasing number of orchardists and they like the first two require that their bees build up rapidly in the spring, resist disease and are not inclined to swarm.

Fourth is the man who keeps bees for pleasure alone. He must have bees that are gentle and beautiful. The more they swarm the more pleasure he will have. As he keeps them to look at, why not pretty bees. You know Jay Smith says you like to look at a pretty girl so why not a pretty bee.

There is quite an argument as to whether you can improve on nature or not. Nature meant bees to live, which means enough honey to get through the winter, and enough resistance to other animals, man included, to protect them from being robbed. Through all the ages bees have been domesticated. We have not bred a better bee, we have only emphasized the qualities most suited to our needs and the time has come when we don't all need the same thing, but a way has been provided to help those upon whose shoulders most of the burden rests.

The queen breeders have learned that both sides of the pedigree may be controlled in bees as well as other classes of livestock. By controlled mating I am firmly convinced that the results will far exceed the hopes of the most optimistic advocates of practice.

We are able to draw some conclusions from other lines and one law is that a female has more influence on her offspring through her sons than her daughters or in other words she has more influence upon the daughters of her sons than the daughters of her daughters.

The next piece of equipment of importance for the queen is her combs. It is the thing most often neglected and requires a great deal of attention. It does not matter what kind of a hive she has, but it must be filled with straight combs of all worker brood, in a good solid frame so it may be examined at will. This sounds easy but must not be lost sight of until this is accomplished.

Full sheets of foundation and wiring are a great help but are not a life insurance as foundation may warp causing crooked combs or stretch. If left to their own devices in trees or boxes, I find after having transferred quite a few that as a rule only enough worker comb is secured to fill about half the frames in a ten frame standard hive.

Next is her food supply. Bees don't like to use the last few pounds of honey. If allowed to run low on stores at any time they automatically reduce the amount of brood. If all these are provided and then she does not make good she should be replaced before the colony is reduced. Here is one of the weakest practices in bee culture. In almost every method the instructions are "queens should be introduced when nectar is coming in." The method I am looking for is one which reads "the best time for introduction is when the colony needs a new queen."

I use the Smith cage held in place by a wire of my own invention and have in a way satisfied my hobby of introducing. When I wanted to, I have introduced during rainy weeks and even in November. This makes a lot of work but some of the other plans make a lot of failures.

About the only things left are supers and winter packing. I will confess I do not know a thing in the world about packing. I always put an empty super on a colony at the beginning of hot weather for ventilation and leave one to absorb moisture and furnish a food chamber in winter. So as the groceryman knows his groceries and the housewife knows her onions so must the beekeeper know his queens.

STARTING WORK IN SECTION COMB HONEY SUPERS.*

(C. F. EARLE, Dalton City, Illinois.)

The secret of producing comb honey, if it may be called a secret, in getting the bees to start work readily in the supers, depends entirely on the beekeeper and the season. The main thing in my experience as a comb honey producer is as follows:

(1) A good young prolific queen, of some known good honey gathering strain of bees, introduced to the colony not later than September 1st of the year previous to the coming honey gathering season.

The idea of this is to have an abundance of young bees to carry the colony through the winter and to have bees sufficient to care for the brood as the queen will start brood rearing very early in the spring under those conditions. So it is very important to have plenty of young bees to keep up the work necessary in the colony at this time.

(2) It is very important that the queen have plenty of room to expand her brood rearing not less than six weeks previous to the honey flow. Therefore, I find by adding one or two hive bodies with drawn combs (8 or 10 frame preferable) for brood chambers gives her ample room to build up the colony for the coming honey flow, which is about the time of blossoming of white clover.

At this time it will be necessary to make these changes of manipulation for comb honey production. Remove top hive body or bodies from colony, sort out sufficient frames with sealed brood to fill one hive body, which is to be the original colony for the season. Now shake all bees and queen from the removed hive bodies and frames into this parent colony. Place queen excluder over the same and add two comb honey supers. The remaining one or two hive bodies with sealed and unsealed brood whichever the case may be, may be disposed of in one or two different manners. One of these methods is quite practicable and indispensable to the comb honey producer, that is the use of the same for the building up of all weak colonies in the apiary.

The other is to use the remaining bodies for making increase to a good advantage by leaving a few bees to care for brood and rearing a new queen. If placed in a new location in the apiary and if treated as a natural swarm they will produce a small amount of surplus honey, besides making a profitable colony headed with a young queen for the coming season.

(3) If bees do not readily take to working in the comb honey supers of which you will note by their hanging out and loafing, conditions can be corrected at once by the following methods: remove hive body from bottom board, remove supers from body and place on bottom

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board in place of hive body. Examine brood chamber finding brood frame containing queen, and set to one side. Now shake sufficient bees from brood chamber to fill comb supers. Replace brood frame with queen back in brood chamber. Place brood chamber on new bottom board, alongside its original location only in a reversed position and leave in this condition for twenty-four hours, after which time remove supers and replace back on original hive body, placing in exactly its former position.

This manipulation is to force the wax drawing bees to draw the foundation in supers and to relieve the congested and crowded condition in the hive body, which is sure to produce swarming, the one feature which the comb honey producer must control.

This is a practical and proven plan which I gladly recommend.

MAKING INCREASE.*

(B. F. Bell, Kingston Mines, Illinois.)

I will give you my plan of fall increase. I keep about 10 to 20 nuclei going during the summer to rear queens and when fall comes I have about that number of queens left over after all colonies have good queens.

I take these 2 to 4 frame nuclei and put each of them in an 8 or 10 frame hive, and supply each hive with enough honey to carry a normal colony of bees through the winter. I put a bee escape board on top of each of those nuclei, then go to the extra strong colonies that have several supers on that are filled with bees and honey. I take off from 1 to 3 supers filled with bees and honey and put them over the bee escape board. I repeat this until I have the supers piled as high as I can reach on top of each nucleus hive. By the time the bees are out of the supers the hive below is supplied with enough bees to make it a normal colony which takes my young queen through the winter in fine order.

The advantage of this plan is this. I have my young queens in the spring to replace any queenless colonies. It doesn't cost me any more honey to board the bees with the young queen than it would have with the parent hive, because you will have to give these extra strong colonies a food chamber to keep them from starving. The built up colonies will be ready for the honey flow as soon as the other colonies and your extra strong colonies that supplied the bees to build up the nuclei will not starve as is often the case. It is almost impossible to get good queens early in the spring in time to save the colonies that have lost their queen during the winter.

* Paper presented at Forty-first Annual Convention of Illinois State Beekeepers' Association, Springfield, Illinois, November 17, 1931.

WINTER PACKING FOR BEES.

(EVERETT PRICE, Toulon, Illinois.)

As I happen to have a lot of 1 x 2 inch, 14 foot strips that I use in the garden to hold up tomato crates during garden time, I use these in making my cases. I figure they are about the right length as 7 or 8 hives can be taken care of and that is about enough in one row to prevent too much drifting. Soft wood is preferable for this work as it will not split so easily in nailing. I will figure 1 x 3 inch lumber for rafters and stakes, as they can be ripped from either 6 or 12 inch lumber. I use a band saw for this work, but any old material may be used.

The length of stakes depends some on the hardness of ground, but will give lengths which I think will be suitable.

Material, woodwork, with numbers to correspond with numbers on sketch, and to be used as numbered, for one case:

6 end strips—1 x 2 x 28 in., No. 12;
4 rafters—1 x 3 x 29 in., No. 3;
4 back stakes—1 x 3 x 40 in., No. 1;
4 front stakes—1 x 3 x 44 in., No. 2;
8 strips—1 x 2 x 14 ft., Nos. 4-5-6-10-14.

Roofing, standard width 32 inches:
2 ends—38 in., No. 11; 2 front and back—14 ft., Nos. 7-9; 1 top—14 ft. 3 in., No. 15.
Lath—About 16, Nos. 8-16.

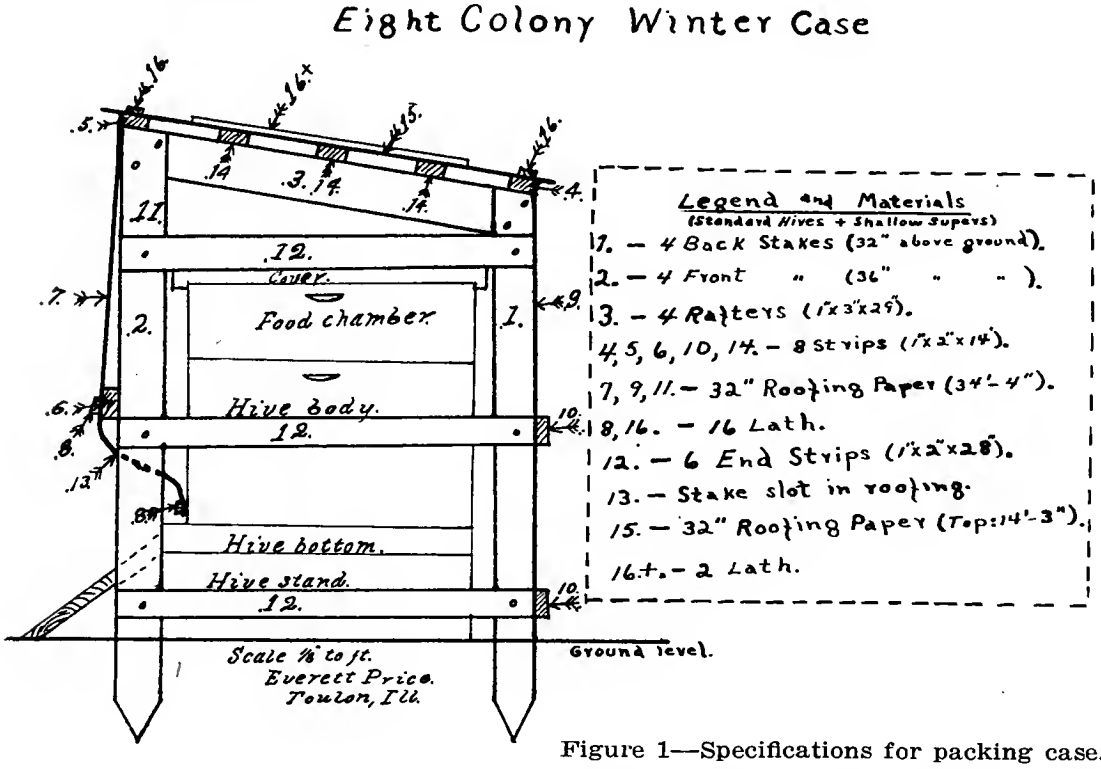
Eight Colony Winter Case
Legend and Materials
(Standard Hives + Shallow Supers)
1. — 4 Back Stakes (32" above ground).
2. — 4 Front " (36" " ").
3. — 4 Rafters (1"x3"x29").
4, 5, 6, 10, 14. — 8 Strips (1"x2"x14").
7, 9, 11. — 32" Roofing Paper (34'-4").
8, 16. — 16 Lath.
12. — 6 End Strips (1"x2"x28").
13. — Stake slot in roofing.
15. — 32" Roofing Paper (Top: 14'-3").
16+. — 2 Lath.
Food chamber.
Hive body.
Hive bottom.
Hive stand.
Cover.
Ground level.
Scale ½" to ft.
Everett Price.
Toulon, Ill.

Figure 1—Specifications for packing case.

PLACING STANDS AND HIVES FOR PACK OF EIGHT.

Select a straight 14 ft. strip, to space stands with. Measure about 6 inches from either end for edge of outside hives and about 3 inches between each hive. Lay this at the back of stands to aid in spacing. In-

cline hives slightly to front to run out water. Lay rafters on hive tops nearest place used to show width of case. Now drive back stakes (No. 1) to leave 32 in. above ground and even with 14 ft. strips at ends, and have 3 hives between stakes at ends and 2 in middle. Next drive front stakes (No. 2) to leave 36 in. above ground. Next nail rafters (No. 3) with 6d nails. Place end rafters on stakes on hive side. Nails need not be clinched if driven right, using two at each place. Next nail on strips (Nos. 4-5-6), one nail to place. Tack front piece of roofing (No. 7) to edge of strip (No. 5) with regular large head roofing nails, about 8 inches apart. Tack lath (No. 8) over strip (No. 6) using four or five 3d nails. Cut slot (No. 13) in roofing over stakes so that it can be bent in and tacked to hive front with lath (No. 8). Next tack back roofing (No. 9) to strip (No. 4), then nail strips (No. 10) in place. Next stand up end roofing (No. 11), let top end be above rafters to be turned over and tacked after packing and roof strips (No. 14) are in place, and before top roofing (No. 15) is in place. Nail on strips (No. 12). This completes the case ready for straw.

Place straw on hive tops and punch down between hives and around sides and ends. Do not ram down too hard but just enough to fill spaces nicely. I use a thin strip about 3 feet long and 3 inches wide to ram with. Put more straw on to fill above hives. Now nail on strips (No. 14), then roofing (No. 15), and fasten down with lath (No. 16) over strips (Nos. 4-5). Nail short lath (No. 16) at each end between lath (Nos. 16 and 16) to hold ends flat.

This completes the case, and if done right makes a case to be proud of. In taking case apart, use care in drawing nails, tie the stakes and rafters in one bundle, lay the roofing flat and roll and tie, make lath into bundle and tie, and place all in storage for the next time. With proper care such a case can be used several years.

Figure 2—Eight-colony winter case in use.

SHORT CUTS AND SIDE LIGHTS IN HONEY PRODUCTION.*

(Dr. William C. Wilson, St. Charles, Missouri.)

Having produced from two to five tons of honey in each of the last fourteen years, and having been in the game ever since I was steen years old, and having but a few short days and half days to give to the bees, I trust you will find something that I have learned by reading, by experience and hard knocks that will help you in this game. It is a great game. You are the learner. Nature is the teacher. The bees are the pawns.

The year's work in the apiary begins in the autumn. If bees are to do well in the spring they must be well *wintered.* Good wintering includes: (1) Some pad or packing, especially on top to prevent too much heat escaping; (2) Preventing drafts of cold air through the hive; (3) Preventing frost collecting about the cluster; (4) Preventing losses from skunks and mice; (5) Preventing clogging of entrance with ice, dead bees, etc.

Skunks in one yard drove me to it. I closed the bottom entrance entirely, and made a 1-inch auger hole in the end of each upper hive body. I winter in two story hives. I knew this entrance had been used by the late Frank Rauchfuss in the more severe winters in Colorado, and I knew he was usually right. It worked. The biggest half of my colonies are using that entrance this winter. Make the hole just below the spacing shoulder of the frames, at lower edge of hand hold.

For wind break we have picket fence. For top heat absorber I have the inner cover, and on it lay one or two pads of Cellotex or other fiber pads. Then with a water proof telescope lid they winter well. One of these pads under the telescope lid, on the inner cover prevents summer heat damages and makes shade boards unnecessary.

If bees winter well and have plenty of honey, spring management is mostly swarm prevention. When I find a colony has no disease and is okeh I enlarge the entrance, and put on a queen excluder and one or two extracting supers long before they are needed, in April.

We have no clover honey flow worth considering, and these two colonies reach the peak of brood rearing long before the main honey flow, August 1st, so we need not be careful to conserve heat in the brood chamber.

Swarming is caused by an over crowded brood nest. I help prevent this by using a bottom board 2 inches deep, with a frame of slats placed a ¼-inch below the bottom bars to prevent burr combs. This gives us a convenient balcony or dormitory where the field bees can easily keep out of the way.

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I continue to use and recommend the deep inner covers with rims ½, ¾, or even a full inch deep, used deep side down. This furnishes a convenient and much used nursery or play room for young bees. We often find this space hanging full of idle bees.

A peep into this space shows if the colony has plenty of young bees, a good queen, and if new comb is being built there, they must have more room today. (For comb honey production use this deep inner cover with flat side down.)

In moving bees in warm weather, remove covers, place over the top of the hive a sheet of wire screen, over this place a queen excluder, a small nail near each corner holds screen secure and takes much less time than to use four strips and eight nails. Some of my inner covers have two holes cut for bee escapes, but this is not often necessary.

Shaking bees from combs for hours is hard on fingers and hands. I use a much easier way. Hold frame by end of top bar, frame upside down. Bump the other end of top bar against sod or loose soil in front of hive with force enough to jar most of the bees off. This is safely done with old combs and cool weather if the line of force is so directed that the impact of the load comes squarely against the top bar, not on a corner or end. I damaged two frames, slightly, out of two hundred in a busy days work last month. Do not strike against a hard surface; it will break too many top bars.

Do I use second-hand honey cans? Sure I use them, but not many of them to ship honey in. The jobbers condemn them, and I guarantee my honey. If any kick comes in from the trade it is passed on to me; so I must play safe.

I use a lot of cans that are not first class by cutting an end or side out or partly out. They can then be used to hold the partly drained cappings. I have no time to melt up the wax so it accumulates in these cans until the end of the season. A can cut in the middle lengthwise makes two handy pans. These open top cans are later used about the home to hold kindlingwood and flower bulbs.

When the extracting combs are all empty and ready to store away, they are a nuisance as long as they are sticky. They not only attract bees and excite robbing whenever exposed but they are liable to sour or ferment and carry too much yeasts into the hives next season. To prevent this I let the bees clean them up. Late in October or November I take a sprinkling can of water, wet each stack of supers to thin the sticky honey so the bees can better handle it. If this is done a day or two before, so much the better. The supers are then stacked up criss cross so that each comb is exposed. The doors and windows are left open and the bees are invited into the annual picnic. After a few warm days the bees have finished the job and quieted down. We have had no robbing or other trouble come from this picnic these many years. But remember, expose all the supers and all else that is sticky so the bees will have more than a day's work at it. I can see where a few supers exposed in a big apiary can start trouble.

I have made the mistake of filling honey cans too full, especially on cold days. And why? We know that honey heated to 160 degrees to be bottled will contract or shrink four ounces to the gallon as it

cools. That amounts to almost a pint in a five gallon can. This rule works both ways and a can filled full with cold honey must expand as the honey gets warm. We have filled cans with cold honey. It is sent to market and stored in a warm room. The honey expands till the end and sides are bulged tight and the can of honey is condemned as fermented.

Sometimes a handful of bees, only a hundred or two, get the robbing habit and follow us about the apiary making life miserable for us and for the peaceable bees we are working with. I like to set out a bait for them and gas them. It is surprising how quiet the yard will sometimes get after a half pint of these trouble makers have been forever silenced. I know that with them, near the end of the season, it is "once a robber always a robber."

USING BEES IN ILLINOIS ORCHARDS.

(R. S. MARSH, Urbana, Illinois.)

In recent years the subject of proper pollination for an ample set of fruit has become vastly important. This has been due to two factors, first, the growth of the commercial orchard industry; second, recent scientific findings.

The early colonists of this country planted their orchards in most cases with seeds. This gave a mixture of seedling fruits, which presented no problem of pollination since there was an ample supply of native bees in surrounding wooded territory. Later all of these home orchards were planted to known grafted varieties, but again the interplanting of these varieties, together with native bees and pollen carrying insects provided satisfactory set of fruit. Following the period of the Civil War, commercial apple growing had its beginning in eastern and middle western states. Large blocks of single varieties were planted so that the growers would have sufficient quantity for carlot shipment. As time went on the selection of varieties for commercial planting was dictated by the market demands as well as by the production possibilities of a given variety. In the meantime, more land was being cleared and placed in production so that the forests and woodlots became quite scarce; hence the natural home of the native bees and other pollen carrying insects was destroyed. On the other hand, the importance of the bee in providing cross pollination for a set of fruit was greatly augmented because of these large commercial blocks of single varities.

In very recent years our Horticultural and Botanical Research groups have discovered some very interesting factors concerning pollination. By observation, experimentation and testing, varieties of fruit can now be definitely classified as to whether or not they are self-fertile, sterile, intra-sterile, cross-fertile or compatible. In the last few years our Department of Horticulture has made some studies on pollen. In these studies they have observed the percentage of germination and the vigor of pollen tube growth in various nutrient solutions and at different temperatures. These research men find that temperatures below 50° F. pollen tube growth is very slow; in fact at temperatures much under 50° the growth of the pollen tube will not be of sufficient rapidity to cause fertilization. They have found the optimum temperature for pollen tube growth to be 70°. At this temperature the growth of the tube is sufficiently rapid to insure fertilization in the limit of time, which is set by the receptivity of the embryo sac. Usually this time period is of 48 hours duration, however this depends on many factors.

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Also in these pollination studies they have found varieties like Grimes, Golden Delicious, Transparent, and Duchess to be ones which produce very vigorous pollen with high percentage of germination. They have also noted pollen from the Winesap, Stayman, and Black Twig to be of non-vigorous growth with a very low germination percentage. The Department of Horticulture at the University of Illinois has also done considerable research work with the embryo sac. Using cytological methods they have observed variations in vigor, period of receptivity and time of disintegration. They have also observed variation in the development in the embryo sac and its disintegration following different treatments of pruning, fertilization, mulching and cultivation. These observed facts may fundamentally explain the reason for obtaining increased set of fruit by the use of nitrate fertilizers, pruning and cultivation. For instance orchard tests have shown that the use of quickly available nitrogenous fertilizers may increase the yield of fruit from 100 to 1,000 per cent. The increase of set of fruit has been observed in like proportions.

Research work in beekeeping has established some interesting facts which must be kept in mind by the practical grower. It has been shown that bees are responsible for a very large proportion of the cross pollination that takes place in an apple orchard during the period of bloom. All beekeepers know that in the early spring, during blooming time, wind, rain and low temperatures keep the bees from flying. It has been found that a twenty mile per hour wind blowing across the entrance of a hive will prevent the bees from flying regardless of the temperature. Also when the temperature drops below 57° F. bees will cluster in the hive. You may be interested in knowing of some correspondence that took place between the Indiana Horticulture Extension man and your good friend Mr. A. I. Root. Mr. Root had written the Extension man asking him to consider a program of introducing bees in Indiana orchards similar to the one that has been so successfully carried on in Michigan. The extension specialist replied that he would be interested in such a project but first research work would be needed to develop a strain of bees which would be adapted to Indiana weather at the time of fruit bloom. He stated that the weather was always windy, rainy and cold when the fruit trees bloomed, and ordinary bees would not make flights under such weather conditions. Mr. Root answered the request in which he thanked the Specialist for his suggestion and stated that he was sending under separate cover a package of bees where each bee was equipped with a rain coat and ear muffs. However, we can readily understand that such a well equipped group of bees would not solve the problem since at a temperature below 50° F. pollen tube growth would practically stop even though the bees were carrying pollen. At low temperatures and without the process of fertilization following the work of the bees in pollination, we could not expect to have fruit set in the orchard.

The modern and up-to-date fruit grower who is to compete in the production of fruit must carefully interplant compatible varieties, use nitrate fertilizer and provide bees for his orchards. However, all of these things may fail to give him a set of fruit should weather condi-

tions be unfavorable during the period of blossoming. In selecting compatible varieties of fruit the following list of suggestions give you those combinations advised by our Department of Horticulture:

Selected Variety—Compatible varieties to furnish pollen.
Ben Davis—Northern Spy, McIntosh, Jonathan, Grimes.
Delicious—Duchess, Wealthy, Grimes, McIntosh, Jonathan.
Duchess—Transparent, Jonathan, Delicious, McIntosh, Fameuse, Wealthy.
Grimes—Stayman, Duchess, Delicious, Jonathan, McIntosh.
Jonathan—Ben Davis, Delicious, Grimes, McIntosh, Duchess, Rome, Jonathan.
McIntosh—Northern Spy, Ben Davis, Delicious, Wealthy, Duchess, Fameuse, Twenty Ounce, Grimes.
Northern Spy—Delicious, Golden Delicious, Rome, (Rome probably best due to late blooming of Northern Spy), McIntosh, Duchess, Wealthy.
Rhode Island Greening—McIntosh, Wealthy, Delicious, Duchess, Transparent, Twenty Ounce.
Rome—Ben Davis, Grimes, Fameuse, Jonathan, Duchess, Delicious, McIntosh, Transparent, Wealthy.
Stayman—Delicious, Duchess.
Transparent—McIntosh, Red Astrachan, Duchess.
Wealthy—Delicious, Yellow Transparent, McIntosh, Duchess, Twenty Ounce.
Winesap—Jonathan, Duchess, Delicious.
Willow—Jonathan, Grimes, Delicious.

These varieties, according to their compatibility for cross-pollination, can be planted in blocks of four or five rows to the block. In a single row, or in another block of four rows, a compatible variety can be planted along side of the first variety selected. The alternation of these blocks through the orchard will provide ample pollination. Any system of planting which provides one pollinating tree for every eight trees to be pollinated will be satisfactory. Of course, it is important that compatible varieties for cross-pollination should be selected so that their blooming periods will occur at the same time. Although all varieties respond with profit to cross-pollination, it is particularly important that Winesap, Stayman, Arkansas, Paragon, Kinnaird and Black Twig be provided a compatible pollen producing variety as they are self-sterile. If planting arrangement for cross pollination has not been made, then bouquets must be used.

All varieties of plums, except a few of the European sorts, some varieties of strawberries, peaches, grapes and nuts require cross-pollination. Sour cherries and apricots, with a few of the bush fruits present no problem of cross-pollination.

In locating bees in the orchard to carry on their service of cross-pollination it has been advised that one colony of bees be used for each acre of orchard. Another suggestion is that the colonies be spaced through the orchard 200 feet apart. It is well to have the bees placed in the orchard at least a week before full bloom so that they will have time to orientate themselves and become accustomed to their new location. Only fairly strong colonies of bees should be used, at least, it seems unwise to use a colony that would have less than three pounds of bees or 15,000 individuals. Beekeepers are aware of the fact that weak colonies of bees spend most of their time in the hive taking care of inside duties; therefore, such a colony would be of little value in an orchard during bloom. Great care in moving bees from the apiary site to the orchard should be practiced.

Most fruit growers are not interested in keeping bees and therefore will depend upon the cooperation of the beekeeper. As our fruit growers become more acquainted with the importance of having bees in the orchard, they will approach beekeepers in their community in order to obtain their services. Since there is considerable risk in moving colonies of bees into an orchard, it is only just that a fair rental price be charged for the bees during the period of bloom, since the amount of nectar or honey gained from apple blossoms would not be sufficient to defray the expense of the hazards impaired. The amount of this rental charge will depend upon the distance which the colonies must be moved together with the recognition of the following hazards. Should the fruit grower unwisely spray his fruit with an arsenical poison during the time when the bees are working on the fruit bloom, there would be heavy casualties among the bees. The hazard of foulbrood must be considered whenever a hive location is changed. The hazard of breaking down combs, smothering bees during the process of moving, must also be guarded against. The following rental charges have been made in Michigan: $2.00 per colony, plus the cost of moving, seems to be the usual charge made by good beekeepers; a charge of $1.00 per colony is sometimes made, but no fruit grower should expect much service from a beekeeper at that price. In New Jersey, rental prices from $5.00 to $10.00 per colony have been charged where the beekeeper had to move his colonies over long distances. Naturally, the matter of rental charge will adjust itself with the supply and demand, and the charge for the colonies will be worked out for the mutual benefit of both beekeeper and orchardist.

ROMANCE OF SWEET CLOVER.*

(E. R. Root, Editor, Gleanings in Bee Culture.)

The romance of sweet clover is remarkable in many ways. At first despised and rejected, condemned by township trustees and state legislatures, pronounced an obnoxious weed by leading farmers, it has now come to be the chief cornerstone of the beekeeping industry of the United States, so far as carload honey production is concerned. Farmers who know it are praising it everywhere because of its value as a soil improver and because during seasons of drouth it affords excellent pasture for cattle as well as bees. The drouth of two seasons in many parts of the country either killed out or greatly impaired the growth of the ordinary white clover, once the mainstay of the beekeepers of the northern states and had it not been for sweet clover springing up in many of these places thousands upon thousands of beekeepers would have had to go out of business for the lack of a proper forage plant for their bees.

I well remember the day when my father, A. I. Root, was roundly condemned by some of our leading agriculturists because he advocated sweet clover as a honey plant, as a pasturage for cattle and horses. He was condemned especially because he sent out tons of literature advocating sweet clover both for the beekeeper and the farmer. In this he was most splendidly supported by the late Joseph E. Wing and by the veteran Charles E. Thorn, then director of the Ohio Experiment Station. Outside of Ohio there was not an experiment station in the United States that would recommend sweet clover and now I think it may be truthfully said that there is not a station in the country but that does recommend it where soil conditions are right. For a once despised weed, sweet clover has left and is leaving a record for achievement that has scarcely a parallel in history.

Had it not been for the beekeepers, sweet clover would not have been spread broadcast over the country the way it was. Gradually it began to push its merits throughout the localities where it gained a foothold. Farmers began to discover that their cattle and horses would eat it as a pasturage, sometimes taking it in preference to anything else. When the farmer began to put out sweet clover as a pasturage crop for his cattle and horses, it was then that beekeepers began to harvest big crops of sweet clover honey.

Some twenty-five years ago the northern hills of Kentucky were regarded as just so much unprofitable waste land. By some chance sweet clover got a foothold on some of this land that had been sold for taxes because it was worthless. It was observed that cattle were feeding upon this sweet clover, then it began to be sown over those socalled

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barren hills. In the course of four or five years sweet clover covered the entire territory with the result that the land was restored to a point where it would grow some of the finest crops in the world and that same land is now regarded as some of the most productive in the United States.

What has happened in northern Kentucky has happened all over the country, where there is sufficient lime in the soil to make it grow, for it should be understood that sweet clover requires a sweet soil.

Gradually sweet clover worked its way over into the Rocky Mountain areas into the portions of the country that had recently been opened up by irrigation. It was found that sweet clover would thrive on land where nothing else would grow; that this legume would puncture the hard pan; would put nitrogen into the soil and break it up so other crops could be grown successfully. In a few years the Rocky Mountain districts were shipping out more carloads of honey than any other area of the United States and it was mainly sweet clover with a little alfalfa thrown in.

Today, sweet clover honey is the main table honey of the United States. There are carloads and carloads of sweet clover and white clover, carloads and carloads of sweet clover and alfalfa, but in almost every case sweet clover is the main source of the honey.

During the last two years of drouth many beekeepers found it very profitable to move their colonies from fifty to one hundred or even two hundred miles in the sweet clover areas. The modern automobile and the truck have made it possible to carry on migratory beekeeping as it was never done before.

Take our own case as a fair example. We had about 1,200 colonies in and about the vicinity of Medina. We had some sweet clover and some white clover but the drouth came on and nearly wiped out the white clover. We moved a few of our colonies up into a strictly sweet clover area where the legume was being grown for pasturage by farmers. Those colonies that were moved produced five and six and in some cases seven supers of pure sweet clover honey.

The drouth continued this year again and so we moved up more of our colonies and again the story was repeated of colonies having five to seven stories filled with sweet clover honey, almost water white and of the very finest flavor that could be desired. When one can move with a modern automobile truck his bees into localities where sweet clover abounds, where farmers are favorable to it, where, of course, the soil conditions are such that it can thrive, he is fortunate indeed. Better beekeepers are moving their bees not only one hundred miles but sometimes three and four and even five hundred miles to sweet clover pasturage and they find that it pays.

So far, sweet clover is a romance. Is there no fly in the ointment? To be candid I must state the truth so far as I know it. While it is admitted that sweet clover pasturage is fine for cattle and that it improves the soil, there is some evidence to show that sweet clover hay does in some instances cause stomach disturbance in cattle. While many farmers claim that they are feeding sweet clover hay successfully there are others who are not so sure. Some say that when the hay is properly cured and cut young enough there is no trouble. Others say that when

the hay becomes moldy it causes stomach disturbance. Several agronomists have told me that the less we say about sweet clover hay the better; that its great value is as a soil improver and as a pasturage plant for dry seasons and in country that is more or less arid from year to year.

We are also told that there is sort of a sweet clover disease concerning which not much is yet known. The plant disappears. The first manifestations is a sort of a wilt, resulting in the death of the plant.

In some localities sweet clover seems to be disappearing. In the famous hills of Kentucky where it was once so luxuriant and abundant, almost no sweet clover can be found today. Whether this is due to the fact that the land was overcropped with sweet clover and was worn out or whether it was due to the fact that the disease attacked the legume and killed it, we do not know as yet.

The attention of beekeepers is drawn to this danger of a sweet clover disease that kills the plant and if sweet clover has been destroyed by some disease in the hills of northern Kentucky we possibly may look for a similar danger in localities where it is now growing so luxuriantly.

Beekeepers everywhere are requested to let me know whether sweet clover is disappearing from their localities. Like foulbrood we should cope with this disease, if disease it is, at the very beginning. A stitch in time will save nine. To use a familiar figure of speech, "Shall we let the goose that lays the golden egg be destroyed by pure neglect or lack of information on the part of the farmer and the beekeeper?"

TONGUE LENGTH AND ITS RELATION TO HONEY STORAGE.*

(Roy A. Grout, Hamilton, Illinois.)

Naturalists and observers for a long time have been interested in the life and habits of the honeybee. In fact, the first records that we have date back several centuries before Christ to the time of Aristotle. However, the first outstanding study which we find recorded in the literature concerning an attempt to rear a bigger or possibly better bee was given us by the incomparable Huber who, at the suggestion of his friend and scholar Bonnet, succeeded in raising worker bees in drone cells and drone bees in worker cells. In the first case, Huber did not notice a difference in the size of the bee, but in the latter case he records that the drone bees were smaller than their brothers which had been reared in normal drone cells.

This attempt of Huber's to raise worker bees from drone cells initiated a long series of observations by many observers who either made similar attempts or observed the phenomenon of worker bees being reared in drone cells. Only one observer, nearly a century later, noticed any difference in the size of the emerging bees. More recently, Martynov, Michailov and Tuenin have conducted long series of observations in Russia upon a similar matter and have shown scientifically that worker bees reared in drone cells are larger than their worker cell sisters. The most outstanding of these three works is that of Michailov. He chanced upon a comb in one of his colonies that in the upper half, contained normal worker brood and, in the lower half, contained worker brood in drone cells covered with level cappings. Michailov took advantage of this phenomenon and preserved the bees for further treatment. He then measured the length and width of the right fore wing, the length of the tongue and the width of the abdominal tergite segments. He showed that the bees reared in the worker cells were smaller than their sisters which were reared in the drone cells. It is of interest to record at this time that the tongue length showed an increase of over 4 per cent.

About the beginning of the twentieth century, several controversies concerning the size of the bee occurred at approximately the same time. The first of these was concerned with the effect of the age of comb upon the size of its emerging bees. It is unquestionable that this had a bearing influence in bringing about the large cell controversy in France and Belgium. At about the same time, the problem of enlarging the bee became an important issue here in America and a long discussion concerning length of the honeybee proboscis and its relation to pollination

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and honey production ensued. The following is a discussion of these three controversies in the order given.

The controversy concerning the effect of the age of the brood comb upon the size of the emerging bees emanated from the supposition that the cast of pupa skin, excrement and varnishing of the cells with the emergence of each generation tended to decrease the size of the cells. Many of the more prominent figures in the beekeeping fraternity took part in this controversy, the majority contending that the age of the comb had no effect upon the size of each succeeding generation since the lengthening of the cells by the worker bees compensated for these factors. As in the case of the worker bees reared in drone cells, microscopical investigations by Tuenin and Michailov showed that the cells of old combs were smaller and that there was an accompanying decrease in the size of the emerging bees.

Baudoux, in Belgium, was the first to conceive of the idea of using a larger size of cells, by increasing the size of the cell base on the artificial foundation given to the bees, with the view of increasing the size of the bee. It was Baudoux's contention that the nurse bees, following a natural instinct, filled the bottom of the larger cells more copiously with larval food and that this resulted in a larger bee. He also intimated that the larger body would generate more heat, resulting in a greater quantity of brood. To accomplish this purpose, he stretched normal foundation to the size he desired and had, by 1896, sufficiently proved his point in Belgium that a manufacturing company began to place artificial foundation having an enlarged cell base upon the market. By means of stretching foundation, he experimented with various sizes of foundation having 750 cells per square decimeter, 740, 730 and so on down to 675 cells per square decimeter in comparison to the normal 857 cells per square decimeter. By means of a glossometer, he determined the tongue reach of his colonies and, by means of a thoraxometer, another ingenius device, the diameter of the thorax. With these two instruments, he showed that the bees reared in the larger size of cells were larger than the normal bees.

Independent of the work done by Baudoux, Pincot in France arrived at the idea of rearing bees from enlarged cells from a slightly different angle. He followed up his line of reasoning and came to the conclusion that this was due to the natural cells being larger than those drawn from foundation and actual measurements confirmed his theory. He then started experimenting with foundation having enlarged cells and reports that during a two year period thirty colonies using enlarged foundation, gave approximately one-third more honey than did thirty colonies on normal foundation. In 1910, his apiaries were destroyed by a flood and Pincot was forced to abandon his experiment.

The only other work of this type up to a very recent date was undertaken in Russia by Lovchinovskaya. He made a very extensive comparison of bees reared in enlarged cells and bees reared in normal cells. The factors that he studied were mainly weight factors and he showed conclusively that the bees reared in large cells were heavier than their sisters reared in normal worker cells, and that the former had a greater carrying capacity.

The problem of raising larger bees and especially bees having longer tongues or a greater tongue reach, has been a topic of great interest in this country since the beginning of the present century. Previous to that time a few observers had noticed honeybees working on red clover and Rankin had successfully attempted to breed a strain of bees having long tongues, but this remarkable characteristic soon disappeared.

Mr. A. I. Root was the first great disciple of the long tongued honeybee. He discovered in one of his apiaries a colony which was working on red clover. Upon measuring the tongue reach of these bees, he discovered that this colony had an unusually long tongue reach. Various claims and contentions were made at that time, not only by Mr. Root but by many others and, either due to lack of sufficient observation, technique in the measurement of the tongue or lack of methods for controlling the mating of the honeybee, these much sought after characteristics soon disappeared.

Many still recall the discussions that appeared in the various bee journals and papers concerning length of tongue and its relation to the acquisition of nectar from red clover at that time. Such men as Root, Miller, Doolittle, Swarthmore, Dadant, Gillette, Getaz and Cook took part in the controversy. The majority believed that the longer proboscis was directly related to greater storing ability in spite of the fact that very little conscientious scientific research was undertaken. The importance of their controversy, however, lies in the effect of their work on the development of the technique for measuring the honeybee proboscis, the breeding and selection of bees and the bringing to the front of a subject that would vitally influence further scientific study along these or similar lines.

This problem, however, did not originate in this country. Previous to the beginning of the present century, Wankler a German worker, had attempted to breed for length of proboscis and had invented and used, by 1882, an instrument for determining the length of the bee's tongue. Wankler failed in his attempt to breed a race of bees having a longer tongue or a greater tongue reach but he is recognized as the first man to show that different races of bees may vary in the length of their respective tongues. Also, Charton of France by 1892, had invented a glossometer which bore his name and, by 1897, had presented some figures which seemed to indicate that bees store in proportion to the length of their proboscis.

Due to a lack of pollinators of red clover, scientific workers of Russia have recognized the importance of the honeybee as a pollinator of this plant and, for many years, have made an extensive study of length of the tongue and its relation to the seed production of red clover. The Russian territory is better suited to such a study than our country since there has been no extensive hybridization and universal shipping of bees from southern territory into the north.

Although the investigations of the Russian workers were undertaken with the purpose of increasing the seed production of red clover, they made one of the most extensive examinations of length of proboscis that has as yet been undertaken by any country and established by long series of observations that there is no race of bees that can be recognized as red clover bees. The longest tongued race of bees was discovered by

Skorikow and had a length of proboscis of 7.22 mm. in length. According to other workers even this length is not great enough for the average bees to obtain nectar from the long-tubed corolla of the red clover.

For many years, length of proboscis has been commonly held as a highly important factor in breeding and selection towards a better bee. Consequently, many have thought that the length of the tongue is the most important thing in the acquisition of nectar. More recently, investigators have advanced the idea that not only does tongue length enter into the acquisition of nectar, but also the flying ability, carrying capacity and vigor of race. Merrill, in 1922, showed that there was no strong relation between the length of tongue and the production of honey. He showed, however, that there was a high correlation between carrying capacity, colony strength, tongue length and yield of honey. He further showed that it is necessary to have all three characteristics present, or at least to have two present in a marked degree, in order to have good yields of honey.

The work of Hutson was conducted along similar lines, using smaller numbers of bees, and showed that, while there was no marked relation between length of proboscis and yield, there was a high correlation between colony strength and the production of honey.

Higher yields from long-tongued races have been reported rather frequently in the literature. In this connection, it is well to remember that Merrill and Hutson measured the tongue of modifications of only one and the same race. Various German and Russian authorities have reported higher yields from other races which have been definitely shown to have a longer tongue. However, it is not known whether or not these yields were based upon the greater length of proboscis.

The practical significance of tongue length in relation to honey storage is very difficult to judge and even more difficult to measure. The hope of a good solution of this problem lies not only in breeding but in selection as well. Breeding and selection, moreover, can come from the direction of the plant as well as the bee. If a bee having a longer tongue should gain significance as a better race of bees, it must completely suffice the economic expectation. Consequently, length of proboscis can never be a breeding goal alone and by itself, since other characteristics are bound to operate in this respect. In other words, we must also consider flying ability, carrying capacity, disease resistance and race vigor as well as many other much desired qualities. All these characteristics go hand in hand towards a better bee that will produce more honey.

Experiments with enlarged cells have caused a great deal of comment and have been deserving of the interest they have created. However, if we consider the work of Michailov regarding worker bees reared in drone cells we will discover that if we increase the size of the cell, by the use of foundation having an enlarged cell base, until the cell is as large as a normal drone cell, we will only increase the length of the tongue 4.37 per cent. A similar investigation undertaken at Iowa State College showed that when the size of cell was increased approximately half as much the tongue length showed a corresponding increase of slightly more than 2 per cent. Therefore, we cannot hope to increase

the size of the bee sufficiently by this means but must also select and breed for the characters desired.

Honeybees are not native to America and since their introduction into this country an extensive hybridization has taken place. Recently, Dr. Watson and others have given us methods for controlling the mating of the queen bee by artificial means. These methods, however, are so intricate and give such a low degree of impregnation that they are not of practical use to a commercial beekeeper and queen breeder. Consequently, this hybridization still takes place and naturally will continue until some more practical method is discovered or science perfects a better race and gives it to us.

Research is taking a hand and the Watson technique is being applied for the purpose of controlling the mating of the queen bee. The scientist is only at the beginning of a long and hard way, but, he is nevertheless on the way to a better bee which will probably have a longer tongue but, without any doubt, will produce more honey. If we consider the many years that many scientists have spent in working out the genetics of the fruit fly and if we consider that their task was many times more simple than had they worked with the honeybee, we will begin to realize the immensity of the task that lies before them. There is no doubt that, in the future, the honeybee will be a better bee and in all probability a bigger bee.

THE FACTORS INFLUENCING THE MARKET FOR HONEY AND BEESWAX.*

(HENRY DADANT, Hamilton, Illinois.)

The forecast and harvest of the honey crop is no doubt a basis for estimating the beeswax crop. It may, therefore, be regarded that honey and beeswax production are directly related and that the price of each rise and fall together to a large extent. This has proven to be true in fact, as well as in theory. But there are exceptions, since honey may sometimes rise or fall the more rapidly on the market and again beeswax may do so.

The proportion of honey to beeswax probably remains about the same from year to year as every cell of wax carries its cell of honey. This is estimated by the following facts and opinions. When thin cappings are cut, about 10 pounds wax is secured from extracting 1,000 pounds of honey. Thick cappings probably increase this to an average of 12 pounds or more. To this figure must be added the wax rendered from combs. Since the proportion of light wax to dark wax received from beekeepers over a period of a year is about 1 to 3½ it appears that we should add 3½ times the capping wax. An allowance, however, must be made for much normally light yellow capping wax darkened by the addition of combs or improper rendering. The proportion may then be an average of 1 to 2½. The total is about 40 pounds beeswax based on each 1,000 pounds honey produced. The wax produced with comb honey is consumed and does not affect this figure. Our beeswax crop is then about 1/25 of the honey crop in weight or in other words, our honey sales must be 25 times the beeswax sales more or less.

Since under normal conditions the wax from the apiarist goes back into foundation for himself or others, there appears to be no beeswax marketing problem except during periods of normal beeswax supply and reduced foundation demand such as at the present time. An occurrence of this kind is so rare that an effort to correct it would be of little avail. Finding new and increased uses for beeswax, however, would help the situation although during times of normal demand for comb foundation, the latter would be increased in price with the advance of wax. The obvious conclusion is that a higher price for beeswax would benefit those who sell for cash while the beekeeper buying foundation would pay the premium.

It is seldom the beekeeper finds like the present that the return from his beeswax is a disappointment while the profitable disposal of his honey is a problem. Apparent overproduction of honey, accompanied by the never failing barometer, low prices, seldom happens to

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beeswax since it is a comparatively staple article of commerce. Yet beeswax has its competitors, as millions of pounds of petroleum waxes are produced and used in our country besides millions of pounds of paraffin and other waxes imported annually. The production of mineral, vegetable, animal and insect waxes is enormous and beeswax could not possibly fulfill the present day uses for wax. It finds competitors on every side. In addition to such well known grades as paraffin, ozokerite, ceresin, montan, Japan, spermaceti, carnauba, candelilla, bayberry and stearic acid, there have appeared comparatively new grades of petroleum wax, viz syncera, superla and cerowax, the past few years. No doubt these are produced by new processes to fulfill certain purposes or to imitate other waxes, resulting in a greater competition of the waxes toward each other. Last of all, we now have several grades of a synthetic wax made by the I. G. Chemical Corporation of Germany and sold by the General Dyestuff Corporation of New York City.

The lower price and plentiful supply of many kinds of waxes no doubt offer formidable competition for beeswax. Yet our product holds its place in the industries and much more of it is used in the trades other than for the beekeeper. About four million pounds are imported annually and more than that amount of domestic beeswax is used in such lines as candles, cosmetics, plastics, polishes, varnishes, insulation, wax coatings, and wax compounds such as dental waxes, besides many other uses.

The prices of the waxes vary according to their supply and demand. Let us consider market quotations of today in jobbing lots on the grades of low to high melting point, crude or refined and dark to light color.

Paraffin is the most common and cheaper grade of the petroleum waxes ranging from 2 to 5 cents per pound. It is the biggest factor in the wax market and its qualities and wide range of melting points, 105° to 135° F. fit it well for many uses. In fact the analysis of a package of candles a number of years ago branded beeswax candles, revealed no beeswax present but a mixture of paraffin, stearic acid and tallow only. Ozokerite and ceresin are found in a more concentrated form than paraffin in the mineral oil deposits of the earth and are of higher melting point. The supply is quite plentiful but the price 8 to 30 cents does not undercut beeswax so much. Montan secured from peat and lignite at 5 to 25 cents competes with its sister mineral waxes to a greater extent than with beeswax. The cheaper at 5 cents is black and not suited to most wax requirements.

Spermaceti is refined from a fatty substance taken from the head of the sperm whale. The price ranges near beeswax, 20 to 22 cents. Its clean white cake and qualities are quite suitable in ointments and creams and is hardly a competitor of beeswax since its uses are not so varied.

Stearic acid sells for about 8 cents per pound and is produced from tallow being separated from the olein. It is produced on a very large scale making a fairly hard pleasing cake quite suitable for wax compounds and other purposes where a fatty substance can be used.

Carnauba wax secured from a species of palm of the tropics and candelilla from a shrub in Mexico are of vegetable origin, both of higher melting point than beeswax. They are of limited production and used

where hardness and high melting point are needed in compounds. Carnauba ranges from 12 to 35 cents depending on crude to refined grades while candelilla sells for 13 to 15 cents.

Japan wax is obtained from berries of several species of Rhus in Japan and California and may be used where a low melting point in compounds is needed. It sells for but 8 to 9 cents.

Bayberry or Myrtle wax sells for about beeswax prices, 20 to 22 cents. It is gathered from a coating of wax on berries of the shrub and is also a competitor of bees wax when used in compounds.

The newer petroleum waxes syncera and superla made by the Standard Oil Company range from 12 to 22 cents a pound. Their physical appearance and melting points resemble beeswax more so than the other grades although adulterations could be easily detected.

A wax brought out by the Vacuum Oil Company, cerowax, for the purpose of electrical insulations sells for 14 to 18 cents a pound. Its firm greasy body eliminates it as a competitor of beeswax in most uses.

The synthetic waxes are high in price under present conditions, topping the list at 30 to 40 cents per pound. They possess hardness, very high melting points and a peculiar odor placing them in a class of their own.

The prices mentioned are New York market in quantities, October, 1931, while beeswax ranges 20 cents per pound, more or less, according to quality.

Every wax has its place in the industries according to its adaptation. If mineral or petroleum waxes had never been discovered, no doubt beeswax and other kinds would be in far greater demand with a higher market in force. Yet beeswax is not near the bottom of the list today but ordinarily rather near the top of the higher priced.

Although, as previously stated, beeswax seldom presents a marketing problem, it is nevertheless affected by lower priced waxes. I quote from a recent letter of manufacturing perfumers and chemists the following: "We wish to advise that we have been able to substitute the beeswax with a much cheaper product and for that reason we are not using beeswax any more." Our greatest competitors seem to be the lower priced waxes. Importations, which probably amount to one-third the consumption of beeswax of this country, has its influence on the domestic market. Yet we have seen seasons when imported beeswax was badly needed to supply comb foundation requirements.

There are occasional world conditions which affect beeswax. An unusual one occurred when post war conditions in Russia stopped the extensive use of beeswax candles in the Greek Church of that country which was formerly supported by the Czar. Some five or six thousand tons imported annually there must now be diverted to other trades and no doubt has its depressing influence on the market. To this must be added the increased production in Russia as apiculture is being encouraged and domestic wax no longer used largely for candles.

A year of big honey crops following a poor season is likely to cause an increasing demand for comb foundation accompanied by a higher price for wax. But when the reverse is true or our expected honey flow fails over much of our country, beeswax becomes less in demand and its market suffers even though production is reduced.

An unusual use of a product for a time is likely to affect the price considerably. This occurred with honey in the later world war years of 1916, 1917 and 1918 when it made one of the greatest climbs in its market known, rising from 8 cents to 25 cents in carlots, a 200 per cent advance, while beeswax lagged behind, moving from an average of about 30 cents to 45 cents, only 50 per cent increase. The demand for wartime material did not affect beeswax except in a general way but honey rose rapidly on account of the unusual demand for sugar substitutes.

Domestic and world crops exert their influence on our markets. A large or normal average crop throughout the whole country has a depressing effect which is likely to be felt everywhere. Since California is reported as the largest honey producing state and exporter, its crop has become more or less of a honey market barometer. When her crop is large the markets of the whole country and even the world feel it unless by chance it is balanced by short crops in other areas of large production. If such states as the intermountain, which are sparsely populated, enjoy a big harvest and exports are below average, we may expect a depressing influence on the price in Illinois even though our own crop is not heavy. On the other hand if such large producing states as New York, Michigan, Ohio, Illinois, Iowa and Wisconsin report a normal or large crop, we may get the price we hope for if the western states are not flooding us with their surplus. In fact they in turn may feel the depressing effect of a large crop in New Zealand or Canada where exports are depended upon. Crops produced in populated areas of the country have the better chance to reach the consumer at the least cost of handling and therefore highest returns to the beekeeper who develops his home market.

The sweet clover regions of western Canada have attracted a large number of new beekeepers resulting in large crops of honey. Ontario honey was formerly sold there but since home production is taking care of home consumption in western Canada, eastern Canada must export to the dense populations of England and Germany which in turn affects our foreign market and our price. So we find our next door neighbor across the line north, affecting our prices in a round about but no less certain way. In fact the retail price of nice clover honey in 5-pound cans in Ontario today is 35 to 50 cents indicating a glutted market and great need for increased home consumption.

The prices of sugar, syrups, and other sweets have a bearing on the demand and price of honey but may be almost insignificant where table honey sales are well developed. Their competition although apparent should not be discouraging as honey possesses ample qualities as a valuable and pleasing sweet to find consumers, if a campaign for it is properly provided. It is the oldest and finest of nature's sweets, an invert sugar in form and most easily assimilated.

The importation of some cheaper grades such as honey from the West Indies have affected the domestic price. A duty of 3 cents per pound was levied to reduce this. The greatest foreign factor affecting us now is the low sales for export. A tariff in Germany is likely to be followed by a tariff in England which indicates we may reap what we have sowed. Canada has levied a tariff equal to our own. The fact that one country cannot long build up a tariff price against a neighbor seems

to indicate that tariffs result largely in simply increasing the cost of living for all.

The honey producer who retails or markets his own crop, holds his customers for repeat orders, and gets a fair price is the very best unit in balancing our honey market. He is to be encouraged and complimented. Nothing too good can be said of him. Others should follow his footsteps for we would have no critical marketing problem if all were like him. In fact the large producers who sell practically all their crop in a lump depending on others to market it, seem too numerous. We need some of them, but would not they benefit themselves and the industry best by producing less at carlot prices and sell more at home?

The success of the honey salesman with the more or less receptive consumer are probably the two largest factors in stabilizing the market of honey. The beekeeper may do his part by producing nice clean honey. He or the seller must see that it is very well graded, packed, labeled and displayed. There must be sufficient advertising or publicity for honey or it may be sold direct, which is a form of advertising. The selling effort and sale is followed by a satisfactory delivery.

Research and public mention is playing an important and in fact vital part in the sale of many food products today. There is a big and valuable job for a research and broadcast movement. The best we have had for honey so far seems to be the work done by the American Honey Institute. This movement was begun after a study had been made of similar work done for other foods. It was then not entirely an experiment. The American Bakers' Institute reported very satisfactory results from the research and published articles in home economic and food columns of many publications and broadcasting over National radio wires. This has been directed until recently by Dr. H. E. Barnard, who was one of our leaders in writing the Pure Food Law of 1906. The public is now thinking and using honey in a larger way than ever before. It has at last been proven that honey can become a household food, and some consumers have become honey conscious. The effort of the local honey salesman, grocer, or large honey packer coupled with the honey campaign of the Institute provides a valuable two-fold factor to improve the demand for honey.

Honey producers report sales resistance has diminished in spite of the present great depression of the country. One independent packer and beekeeper reports honey sales almost doubled over previous years and has found the campaign of education for honey by the Institute a good factor facilitating sales.

The American Honey Institute was started cautiously and as economically as possible. A few individuals and concerns risked a combined sum of $5,000.00 to $6,000.00 to start the movement. It has developed under the direction of Dr. H. E. Barnard and work of Miss Fischer with assistant until we have a movement deserving greater support. The work of publishing articles in Baker's and Food Magazines, in home economic columns and food departments of many other publications, is well known. Booklets and leaflets such as "Honey in the Bake Shop," "Honey Helpings," "New Uses for our Oldest Sweet," "Reduce the Honey Way" and others have been sold and distributed by thousands.

The broadcasting of talks on honey used in connection with other foods has given honey a place before the public of inestimable value for no cost except the furnishing of facts about honey from the Institute office. An interesting and valuable broadcast was made by the Betty Crocker Department (Mrs. M. C. Husted) for Washburn Crosby Gold Medal Flour and incidentally honey was mentioned as prominently. In fact most food producers are glad to associate their products with so delicious and fine a natural sweet and food as honey.

It is expected that the consumption of only 2 or 3 pounds of honey per capita in this country can be increased. The effort to properly grade, pack and sell honey continues by beekeepers and packers. The moral and financial support of the American Honey Institute should be carried on to improve results and not lose the ground already gained. These are the two big factors influencing the market for honey.

ARE BEEKEEPERS' ORGANIZATIONS ACCOMPLISHING THEIR FULL PURPOSE?*

(By JAS. I. HAMBLETON, Senior Apiculturist, Bureau of Entomology, United States Department of Agriculture.)

Even before beekeeping in the United States came to be looked upon as a distinct industry beekeepers' associations were in existence. In some states the state beekeepers' organizations have been holding annual meetings continually for years, and in this country there has been some semblance of a national beekeepers' organization for many many years. Beekeepers' organizations have come to be looked upon as an inseparable part of the beekeeping industry. It would probably be safe to say that on an average at least one hundred beekeepers' meetings are held annually in the United States, and if it were possible to count the number of state and local meetings, and meetings of a national character that have been held during the past ten years, the number, as well as the total number of beekeepers in attendance, would be surprisingly large.

In considering the meetings which have been held during the past decade one naturally wonders just what part beekeepers' organizations have played in the development of the industry. Unquestionably visible headway and numerous improvements have been made in honey production. These improvements may be attributed in large part to those made by the beekeepers themselves, and to the work of state and Federal agencies. There should also be included with this group beekeepers' organizations because it is almost universally the case that a large part of the programs of all beekeepers' meetings is concerned with production, and it would be wrong to state that the discussions which have taken place during these meetings have not been productive of good results.

During this period, when improvements have been made in production, little or no progress has been made in marketing. The great impetus given to honey during the war, and the fact that many people used honey then when they had not done so before, gave an unprecedented boom to the industry. Unfortunately, and perhaps largely through the fact that the industry was not organized on a business basis, the advantage created by the situation was not grasped.

Certainly during the past ten years beekeepers' organizations of the United States cannot be credited with an improvement in honey marketing conditions. This may seem rather strange in view of the fact that perhaps the best minds of the industry are usually found at beekeepers' conventions.

Just wherein lies the trouble, and why is it that this vast number of intelligent people, who are thoroughly interested in apiculture and

* Reprinted from The American Honey Producer, 5:59-62, July, 1931.

who would benefit by the improvement of conditions relative to honey marketing, have been loath to inaugurate remedial measures? Perhaps an insight into the present status of beekeepers' organizations may give some clue to the answer. For the most part the work of the majority of beekeepers' organizations, whether state or national, which are now in existence, depend upon a single annual meeting to transact perhaps 90 per cent of the business, and perhaps 90 per cent of this socalled business has to do with the annual meeting itself. Here, then, is one place wherein our organizations are weak—the confining of the transaction of a year's business to one or two days.

What takes place during the two or three days of the annual convention of the average association? In the first place, and speaking from personal experience, secretaries of state organizations usually write to prospective speakers asking if they will give a talk at such and such a time. It is quite rare for the secretary of a state association to indicate to the prospective speaker a subject for him to discuss. In the majority of cases the speaker is left to select his own subject.

This method of arranging a program is at best non-constructive and usually results in an unbalanced program as far as the accomplishment of a definite aim is concerned. Such programs usually prove interesting. It is doubtful whether a beekeepers' meeting was ever held that was not interesting. There is no criticism on this score. A valid criticism would perhaps be that the meetings are so interesting that all sight is lost of business matters.

To return again to the matter of speakers being compelled to select their own subjects, the speaker, being human, naturally selects a subject which he thinks will be popular, and as an alternative, a subject which will impress the audience with his profound and technical knowledge. Of the two, the former is usually the better because there is the chance that the speaker will have something worth saying. In the latter case, it is only on rare occasions that any one can understand what is being said. Moreover, the type of paper referred to in the case where the speaker wishes to give the impression of his wisdom means much more if it can be read in a journal and studied at leisure. During the delivery of such a paper on the floor of a convention the time of the audience is largely wasted, and the services of the speaker might much better be utilized in the counsel of committees or in discussions on the floor of the convention.

When an organization fails to have a definite aim, the program at the annual meeting, or at any meeting for that matter, is apt to be equally as aimless, although interesting, and the fact that beekeepers' meetings are interesting is largely responsible for keeping the present numerous organizations intact. When speakers choose their own subjects, popular topics of the hour are usually given, resulting invariably in an unbalanced program. It is for this reason perhaps that bee diseases have come in for such a large share of attention. As a result talks on bee diseases have gone unbridled, and this has helped to lead the industry into the present situation, where more state funds are being expended on bee diseases, which take a toll of perhaps less than 10 per cent annually, than on all other problems put together. Winter losses alone amount to a minimum of 10 to 12 per cent annually, and yet

problems of this kind of such vital importance to the industry, are quite disregarded so far as concerted action on the part of beekeepers' organizations is concerned.

During the past year the subject of pollination has crowded bee diseases for first honors at the annual meetings of numerous associations, and in the opinion of the writer, because of the absence of any clearly defined policy or purpose on the part of the industry, the subject of pollination is already assuming a somewhat ridiculous aspect with regard to beekeeping. The majority of speakers who have concerned themselves with pollination have been those who have been interested primarily in apiculture, and interested not at all, or secondarily, in the production of fruit. Yet even those apiculturally inclined are laying stress on pollination not from the standpoint of the beekeeper but from that of the fruit grower. Beekeepers' organizations seem to be quite concerned in assisting the fruit grower to increase his crop. This is all well and good, and a charitable thing to do, but is this course sound when our own house is in disorder and when there are so many ways in which beekeepers could improve their own industry? In our efforts to help the fruit grower let us not forget the beekeeper, and the mere fact that the beekeeper is given a certain rental for his bees does not necessarily mean that he is profiting thereby. A number of beekeepers have recently discovered by having check colonies that were not moved into orchards that the meagre rental per colony was not sufficient to offset reduced production and the cost of moving. Time and again the industry has gone off on similar tangents and it has always been necessary to wait until the slow process of evolution brought about a correction.

Beekeepers meetings are not failures because of an inadequacy of resolutions. If only a small number of the resolutions which have been made during the past ten years had been followed up until action was obtained, the beekeeping industry would probably be in a better condition than it is today. There is no gainsaying that the industry does not lack strength either in ability or numbers.

We continue to wonder why honey does not sell better and why the price is so low. We like to attribute it to the present depression, but, with the exception of the period of the war, prices have been uniformly low, and yet the industry is doing practically nothing to advertise honey. There has been a tendency during the past few years for beekeepers to give a great deal of free advertising to the manufacturers of various food products who see in the word "honey" an advertising asset. Some beekeepers seem to feel that if the manufacturers of food products all used the word honey on their packages this would suffice as a form of advertising. Giving cooperation to these companies is a courteous and the correct thing to do, but to hang on the skirts of the manufacturers of food products in the expectation that our marketing conditions are going to show an appreciable improvement will likely find us dragging far to the rear, very close to the dust.

Honey, although perhaps the oldest of our agricultural products, is unquestionably the least known. Moreover, it cannot be said that honey is a necessity. Honey is a luxury. Is there an article of luxury which

is sold to any extent without extensive advertising? There are many products which we are now using on which the advertising costs amount to more than the product itself. In other words, when we buy certain articles and certain food products we are paying more, much more, for the advertising than we are for the product itself. The modern psychology of selling demands that even the necessities with which everyone is acquainted, such as salt, be widely advertised. Even soup, a product which almost every housewife can prepare easily, is advertised through out the country. Yet honey, a little known product and a luxury, has done remarkably well to hold on with almost utter neglect in the face of the keenest competition.

Realizing that the average consumer is not acquainted with honey and is rather skeptical about buying it for fear of getting an adulterated or a manufactured product, the Department of Agriculture several years ago established the United States grades of honey. The grades were established to facilitate business transactions in honey and to enable those who sell honey to label their product with the United States grading stamp. Since the United States grades apply only to pure honey, the consumer who purchased a package of honey containing the United States grade stamp was assured that the product was of the best edible quality and that it was pure beyond suspicion.

The fact that the industry is so poorly organized may be one explanation why the United States grades have not yet been more widely adopted. Here the industry has available at little or no cost a medium for advertising honey which it does not now utilize. One wonders just how much good it will do to inaugurate further improvements which have to do with the marketability of honey. Even if an absolutely new method is found for preparing honey, which will make it more attractive, better as a food, and more pleasing in appearance at slightly extra cost, would the industry profit thereby in its present state of organization?

We have a country-wide nucleus in our present organizations for placing the industry on a businesslike basis, but my firm belief is that no marked improvements will occur in many fields of beekeeping until more attention is given to business affairs, until annual meetings of state and national beekeeping organizations devote more, or at least as much time, to business affairs and to the outlining of worthwhile projects as they now do to merely interesting and haphazard programs.

The successful commercial beekeepers have learned that they can only spend a minimum amount of time in listening to the pleasant hum of the bees, and in examining every comb and working for hours over a single colony. In like manner, beekeepers' organizations should put aside for special occasions the interesting prattle of beekeepers and give more attention to real business. When we have state-wide and nation-wide meetings, let us utilize the talent that is gathered there and not waste our time. After all we can obtain a great deal of satisfaction from a real business meeting, just as a successful commercial beekeeper gets satisfaction in viewing the results of his season's labor. Let us first take care of the business and not relegate the business session to the last two hours on the last day of the convention when our time and money are running low and everyone is anxious to hurry home.

DISEASE ERADICATION.

(M. G. DADANT, Hamilton, Illinois.)

Perhaps no subject has found so much discussion among beekeepers in recent times, and been so thoroughly written up in the beekeeping press as the disease of bees known as American Foulbrood.

American Foulbrood has been known to exist in bees for many years, and it has been generally recognized that there was a method which might not only control, but also eradicate the disease, namely the shaking or McEvoy treatment. This consists generally in separating the colony from all infected material and allowing it to rebuild its home anew with no possibility of contamination. In doing this, the orthodox method is to shake the bees and queen into a new clean hive on starters of bee comb foundation, allowing them there for twenty-four hours, removing the starters and replacing them in the hive with full sheets of foundation in the frames, thence allowing the colony to proceed in rebuilding its home free from any infection.

All of the old infected material, of course, is to be disposed of so as to have no possibility of re-infecting this colony, or, for that matter, any other colony of bees.

In theory, the plan is undoubtedly satisfactory for eradication of this disease. But how does it work in practice? Any one will perceive that the extent of eradication will depend entirely on the skill, care and knowledge of the beekeeper. And not only of himself, but of his neighbors surrounding.

Inasmuch as contamination is spread from honey and comb, failure to dispose of the shaken diseased material in a thorough manner may lead to re-infection. Such re-infection may occur through the spilling of honey or nectar in shaking, the drifting of honey laden bees to other colonies, improper handling of the shaken combs and honey, and in fact in dozens of different ways. Moreover, beekeepers are great individualists, experimenters, they try variations on the old tried method of eradication, sometimes with success, sometimes not.

It looks like an enormous waste to burn all infected material, in fact this was not expected when the shaking method was first suggested. As a consequence the honey is often saved and shipped into the open markets, there possibly to re-infect a neighbors' bees, or that of an innocent beekeeper many hundreds of miles away, where the bees come in contact with some of this contaminated sweet.

The result has been that, in practice, instead of getting eradication of the disease, we have gotten instead control to a more or less extent. The large number of hidden or deserted colonies in the thickly populated sections has also complicated matters, as has the fact that bee inspections are not always possible in all states or in all sections through inadequate

funds, inadequate inspectors, lack of cooperation of beekeepers, inadequate laws, and for many other reasons.

Within the past few years, there have arisen two general lines of thought with reference to the handling of American Foulbrood. The one class believes that American Foulbrood has come to stay. That complete eradication is as impossible as it is in the handling of San Jose scale disease of apple trees. That even if it were possible to get eradication by a vigorous burning plan, yet would it be impossible, because of the enormous expense of instituting such a campaign with a disease which is so generally distributed. They further argue, that although near eradication is possible perhaps in one state, much of the good work is undone, since the next door state may have no inspection at all, or only a makeshift one. Education, to them, in combination with control measures, will keep the disease in check, wax can be saved by melting combs, honey extracted and shipped to city markets where a minimum of harm will result, and the disease be handled with maximum results and minimum expense.

The other class. and a fast growing one, includes those who argue that we have had, already, fifty years of control measures, and that it has gotten us nowhere. That the only way to work out of the American Foulbrood "mess" is to cleanup, and cleanup thoroughly. Get adequate funds, make thorough inspections, and not wait for the beekeeper to eradicate the disease, but let the inspector do the job right on the spot. The entire south, or bee shipping area has adopted this plan, in fact, must necessarily do so. As a result, their percentage of disease, while still apparent, still is negligible (about 1 per cent). Similar campaigns are commencing in other states farther north.

The argument of the "burning" man is that before the inspector arrives, the beekeeper has already had sufficient time to go over his bees himself, detect the disease, and handle it by his own methods if he desires. If the disease, or infected material is still at hand when the inspector arrives, it is certainly a sign that the beekeeper is either careless, stubborn, or ignorant, and that from any of these three classes, no cleanup campaign on his part may be expected.

While it is true that apparent and perhaps complete eradication may be accomplished by the careful and methodical beekeeper, and at a minimum of loss, still, it is extremely doubtful if anything but the burning plan will ever make for complete eradication in any wide territory, and even then the progress will undoubtedly be slow especially in the heavily populated areas, owing to the difficulty of locating all bees, and of securing sufficient funds for such eradication work.

Pursuing as different policies as the different states do, is it not possible that sooner or later the controversy may become so hot as to perhaps do injury to the industry they are trying to protect?

What may we expect to happen? Will the proponents of burning give up in disgust? We think not. They are succeeding too well in the areas they are inspecting. Will they, then, institute embargos from outside, on all possible sources of infection? They have similar regulations in plant disease control.

Perhaps Federal regulations uniform in nature might solve the problem. Another "State's right" taken over by the Federal government.

Or perhaps it may be feasible to have a middle of the road policy with all states co-operating for a solution of the work by a gradual uniformity of laws and practice until the desired end is attained.

Personally, the writer believes that we should have eradication rather than control, and that such eradication will never be obtained except by rigid laws, rigid inspection, and the destruction by fire of infected material, with perhaps salvage of more valuable equipment through scorching.

The argument of great losses through such a process, are in fact true, as concerns the individual beekeeper with a heavy infection. On the other hand, the state over, we believe that the loss is justified by the great savings through the reduction in disease percentages.

A one per cent saving in disease over a period of one year, in a great state like California, when counted in saving of labor, initial colonies, and their honey crop, makes a sum which shows very favorably in comparison with the expenses of such a campaign. And the saving is like a snowball, it grows as the years advance and the disease percentage diminishes.

THE AMERICAN HONEY INSTITUTE.*

(LEWIS PARKS, Watertown, Wisconsin.)

I feel that a talk on the American Honey Institute is superfluous at a meeting of well-informed, well-read beekeepers, for the reason that much publicity has been given the Institute and its work in the bee journals the past three years. I feel that my time might be better spent in going on with my work of raising the much-needed funds to keep the Institute going. Our work is receiving much commendation but not enough financial support, and this reminds me of the Scotchman who sat in church and, when the collection was taken up and the plate held before him, there was no jingle of coins. Instead, the Scotchman said to himself, "I credit the minister with preaching the best sermon I ever heard."

Yes, we are getting lots of credit for the Institute's work, but not enough cash, and that is what we have to have to keep going. Now, please don't all get scared and leave the room for fear that I might have someone lock the doors and pass the hat, for I am going to do no such thing.

Though I believe most beekeepers are very well informed on the Institute and its accomplishments, we do run across one occasionally who hasn't read our publicity as much as he should. For example, Miss Fischer of the American Honey Institute wrote me the other day that at the time of the Betty Crocker broadcast an Indiana farmer and his wife made a special trip to Indianapolis and came up to the Institute offices expecting to find a big celebration going on. They were very much disappointed not to see an immense honey show with demonstrations and lots of people walking around.

I. HOW FOUNDED AND WHEN.

As most of you know, the Bee Industries Association, consisting of nine bee supply manufacturers, which was organized in August, 1927, for the purpose of working out its common problems, felt the need for creating a bigger demand for the product of the industry—honey—which would, accordingly, increase the price and thus give the beekeepers more income with which to expand their activities.

Laying all thought of manufacturing problems aside, it was planned to call together all representatives of the allied trades, beekeepers' associations organized for profit, and those not organized for profit, as well as honey bottlers, queen breeders, manufacturers of glass jars and tin cans, and organize an institute whose function it would be to tell the American people all about honey, its value and how it could be used, and thus create this greater demand for the product of the industry.

* Paper presented at the Annual Meeting of the Wisconsin State Beekeepers' Association, Milwaukee, Wisconsin, December 4, 1931.

Accordingly, on March 31, 1928, this group founded at Indianapolis the American Honey Institute, incorporating under the laws of Indiana, and engaged Dr. H. E. Barnard as President and Director. A Board of Directors was elected, with five representatives of bee supply manufacturers and one representative of each of the other groups mentioned, eleven directors in all. I was chosen as Chairman of the Board and L. C. Dadant chosen as Secretary-Treasurer. Almost a year later, Malitta D. Fischer was added to the Institute's staff, bringing to it her vast experience with honey in cooking.

What Can Be Accomplished?

At one of our earliest meetings it was pointed out by Dr. Barnard that honey would receive much publicity if combined with other foods, as, for example, baking powder biscuits, citrus fruits, bread, cheese, cake, milk, etc. Accordingly, contacts were made with these various industries and in due course articles on honey were running in the magazines of bakers, restaurateurs, hotel men and in food magazines generally. Information on honey was being furnished to food column writers by means of clip sheets. Radio talks were written up and sent to various broadcasting stations. Through Dr. Barnard's acquaintance with General Mills, manufacturers of Gold Medal Flour, he was able to arrange for a meeting between Miss Fischer and Betty Crocker, which resulted in the 15 minute National Broadcast on honey last year, as well as this year.

The booklet, Honey in the Bakeshop, was published and distributed to bakers all over the United States. Honey recipes that in the past had never been seen in bakers' magazines began to appear and do still appear. News notes, showing interesting progress of the Institute, were sent out monthly to the contributors. Contacts were rapidly made with home economics women in the schools, colleges, and in various industries, as, for example, the Kellogg Company, Pabst Corporation, Malleable Range Company, Procter & Gamble, and numerous others.

While this was going on in the capable hands of Miss Fischer, Dr. Barnard was securing a government appropriation for $12,500 for honey research work and one of the outstanding results has been the clarification of honey, which may turn out to be a blessing for the beekeepers who find it difficult to market their darker grades. Considerable work has been done to prevent the misbranding of foods advertised to contain honey and which contain no honey.

A committee on traffic problems was appointed and, after two years' efforts, rates on honey were reduced all the way from 12 per cent to 21 per cent. Reductions in freight costs of approximately $100 per car were secured on honey shipments to Pacific Coast terminals, for export. Honey in metal cans was reduced from second class to third class, l. c. l., in eastern and southern territories. Wax rates were reduced.

Contacts were made with hospital dietitians and numerous recipes for convalescents furnished to them.

The publicity given National Honey Week through the American Honey Institute and through the A. & P. and Betty Crocker broadcasts alone has been worth more than the annual cost of the Institute. Were

this same publicity secured through space advertising in the magazines the cost would run to at least $25,000 per year.

Miss Fischer has done splendid, outstanding work in training and developing others to make honey demonstrations. The various county and state association secretaries are being contacted and urged to secure subscriptions for the Institute at their annual meetings, either on the $1.00 per ton basis, one-half of 1 per cent of the crop, or by means of an outright donation.

In connection with the Betty Crocker broadcast, I would like to ask, first, how many of you have radios? Please raise your hands. Now, I would like to ask how many of you listened to the Betty Crocker broadcast? Perhaps you were unable to tune in on it, due to the fact that the hour was changed without giving sufficient public notice. No doubt, many of you observed the splendid cooperation the Kellogg Company gave National Honey Week through the honey and breakfast food window cards they sent to all stores selling their products.

The work of Ruth Chambers, Director of the Home Service Department of Malleable Iron Range Company, Beaver Dam, Wisconsin, was splendid. You should write her for her recipes, calling for honey. Miss Annette Snapper of the Pabst Corporation got out one of the finest recipe books on honey and cheese that I have ever seen. It certainly was a work of art.

The National Honey Week stickers, those blue stickers that went all over the United States and probably into many parts of the world were a splendid piece of lithographic art and the design was made by our own Lavonne Taylor, assistant to Miss Fischer at the Institute.

You will be interested to know that Constance Luby, Professor of Home Economics at University of North Dakota, has just published a honey circular, in cooperation with Professor Munro. Their interest in this work was developed by Dr. Barnard, who has been urging better cooperation between the Home Economics women and the Entomology Departments of the various universities, so that joint publications are now being issued by some of the experimental stations.

Although I had attended bakers' conventions and various bread and cake demonstrations for years in connection with the G. B. Lewis Company's Breadbox Department, I never, until last year, saw honey demonstrated in the cake baking classes as I did at the annual meeting of the American Bakers' Association at Atlantic City last September.

That the Institute has made an *impression* is indicated by the following from Mr. Tom Burleson, Waxahachie, Texas, who says, "I have recently studied the purposes of the American Honey Institute, and I must say that I consider it the greatest organization ever to promote the use of honey, and with the increased use the better the price will be. If the producers knew what an opportunity they had with this organization to better their condition, I am sure that they would all become subscribers to this fund."

The late Frank Rauchfuss, Secretary and Manager of the Colorado Honey Producers' Association, Denver, Colorado, said: "It is my opinion that the American Honey Institute has given the honey industry more and better advertising than could be expected on the small investment made. If the Honey producers of the United States will give

the proper financial support to the Institute, then we may expect a decided improvement in the honey marketing situation reasonably soon. Larger per capita consumption of honey at home is our goal, and the Institute's efforts have all been in that direction."

Mr. W. E. Doty of General Mills, Inc., who has charge of a department that sends recipes out to bakers, has requested Miss Fischer to write out her honey recipes on 3 x 5 inch cards to fit the standard card file furnished the bakers by General Mills.

The Following Are Some Suggestions of What the Institute Might Do.

Many suggestions along the line of what the Institute might do, keep coming in from time to time, and it sometimes keeps us busy turning down requests for testimonials or special help for some individual, whereas the purpose of the Institute is to benefit the *entire* industry.

It has been suggested that the Institute make an effort to educate the consumer on how honey should be put up for the market. This, we believe, is a problem that should be left to the League and the Southern Conference. The Institute can, however, make recommendations but it will be up to the two groups mentioned to see that honey is properly prepared and packaged for the market.

Of course, most of you know that Dr. Barnard resigned as President and Director of the Institute on September first, due to his accepting a splendid position with Corn Industries Research Foundation. Our budget has, accordingly, been reduced from $8,040.00 to $4,320.00 per year, and it is believed by the Directors that enough momentum has been developed under Dr. Barnard's guidance to keep Miss Fischer and her assistant, Miss Lavonne Taylor, busy for several years to come. Due to general conditions, however, we find it difficult to even raise the smaller amount of $4,320, so that it is going to be necessary for as many honey producers as possible to lend their support to the Institute's work.

The first two years the bee supply manufacturers and allied trades entirely supported the Institute, with the help of the larger beekeepers' associations. Last year 90 per cent of the expense was covered by this group and 10 per cent covered by the beekeepers. The past year the percentages have been 80 per cent and 20 per cent. If, at some time in the future, the honey producers take over the major portion of the expense of the Institute they will *then* be accorded a greater number of Directors on the Board, so in that case *control* will pass from the *manufacturers* to the *producers,* where it really belongs.

For a while it looked as if the Institute was going to die for lack of financial nourishment, but now most of the directors feel that if the honey producers will increase their subscriptions about 10 per cent and we can get through the balance of this fiscal year up to March 31st, the Institute will then continue on indefinitely.

The annual meeting will be held at Columbus, Ohio, on January twenty-fifth, followed by the League meetings on the twenty-sixth, twenty-seventh, and twenty-eighth. I hope to see as many of you as possible there.

ILLINOIS CONTRIBUTIONS TO THE AMERICAN HONEY INSTITUTE.

1930.

Illinois State Beekeepers' Association	$25.00
Individual beekeepers:	
Dadant & Sons, Hamilton	17.00
C. J. Anderson, Morris	1.00
V. G. Milum, Champaign	1.00
F. A. Boedecker, Chicago	3.00
Ray Page, McHenry	1.00
R. J. Barthoff, Richmond	1.00
E. M. Klein, Gurnee	1.00
C. F. Rife, Naperville	2.00
Total from Illinois beekeepers	$52.00
Supporting members:	
Dadant & Sons, Hamilton	$500.00
Phoenix Hermitic Company	50.00

1931.

Individual beekeepers:	
C. J. Anderson, Morris	6.50
V. G. Milum, Champaign	5.00
S. F. Peterson, East Moline	5.00
O. R. Matthews, Virginia	3.00
Ralph McInnes, Sidney	1.00
A. L. Kildow, Putnam	5.00
C. S. Watts, Monticello	6.00
Ivan Whiting, Roscoe	6.00
Geo. W. Lynn, Lockport	3.00
Peoria County Association members:	
B. F. Bell, Kingston Mines	5.00
C. G. Streider	1.00
Ogle-Lee County Association members:	
Geo. L. Sauer, Polo	3.00
Clyde Wilde, Oregon	1.25
S. S. Clausen, Oregon	1.00
Tom Bedoes, Rockford	1.00
Woodford County Association members:	
Benj. H. Fischer, Roanoke	4.00
L. B. Meister, Metamora	.50
Virgil Rocke, Eureka	1.00
Alfred E. Thomas, Secor	1.00
J. P. Scheid, Eureka	.50
Lawrence Rocke, Roanoke	1.00
Cook-DuPage County Association members:	
E. A. Meinecke, Arlington Heights	25.00
Samuel Cushman, Chicago	1.00
E. J. McCormick, Chicago	1.00
Brother Frederick, Techny	3.00
C. F. Kannenberg, Oak Park	1.00
Gun Mozee, Chicago	1.00
J. J. Spangler, Downers Grove	1.00
Wm. J. Wallanches, Downers Grove	1.00
Miss Anna Krier, DesPlaines	1.00
C. L. Duax, Chicago	10.00
J. Frank Haan, DesPlaines	5.00

C. F. Rife, Naperville	$1.00
A. D. Boal, Downers Grove	1.00
E. W. Brown, Willow Springs	.50
Chas. Newman, Chicago	.50
Frank Hofmann, Riverside	3.00
Melville M. Guthrie, Chicago	1.00
W. H. Aibble, Wilmette	1.00
Harry R. Warren, Chicago	5.00
Wm. C. Young, Chicago	1.00
Mrs. Eleanor Simmer, Chicago	5.00
A. W. T. Doermann, Blue Island	1.00
F. A. Boedeker, Chicago	1.00
Total, 1931, from 44 beekeepers	$131.75

County Associations:

Tri-County Beekeepers' Association	$ 2.00
Ogle-Lee County Association	2.00
JoDaviess County Association	5.00
Will County Association	5.00
Rock Island County Association	5.00
Henry County Association	10.00
Mercer County Association	5.00
Peoria County Beekeepers' Association	5.00
Total, 1931, from 8 County Associations	$39.00

Supporting members:

Dadant & Sons, Hamilton (to October 16, 1931)	$475.00
A. I. Root Company, Chicago	25.00
Total, 1931, from supporting members	$500.00

PLEDGED FOR 1932 INSTITUTE WORK.

Illinois State Beekeepers' Association	$60.00

Individual Beekeepers: (Paid in full)

E. A. Meinke, Arlington Heights	10.00
C. P. Jankowski, Gurnee	1.00
C. J. Anderson, Morris	8.00
L. Peterson & Son, Kewanee	1.00
V. G. Milum, Champaign	5.00
H. C. Dadant, Hamilton	5.00
S. F. Peterson, East Moline	1.00
C. F. Earle, Dalton City	5.00
A. G. Gill, Chicago	5.00
Phillip Krebs, Marissa	1.00
H. L. Dunn, Onarga	5.00

(Will your name be on the complete list? The American Honey Institute must carry on. Do your bit!)

COUNTY ASSOCIATION ACTIVITIES FOR 1930-1931.

Champaign County Association (10-18).*
(V. G. Milum, Champaign, Secretary.)**

This association after a period of inactivity held a reorganization meeting on Friday evening, August 14, at the home of M. E. Smith of Mahomet. Officers selected were W. H. Force of Champaign, President; Rev. E. J. Rees, Urbana, Vice-President; and V. G. Milum of Urbana, Secretary-Treasurer. The association went on record as favoring the program of bee disease eradication by the State Department of Agriculture in Champaign County and the State of Illinois. Various phases of beekeeping were discussed.

Cook-DuPage County Association (69-56).
(E. J. McCormick, Chicago, Secretary.)

The first meeting of 1930 was held at the Bismarck Hotel, Chicago, on the evening of February 6th and officers were elected as follows: President, A. D. Boal; First Vice-President, Wm. Bigel; Second Vice-President, Mr. Ed. Groh; Third Vice-President, Mr. A. Bodenschatz; Fourth Vice-President, C. L. Duax; Fifth Vice-President, Miss Anna Krier; Secretary and Treasurer, Mr. E. J. McCormick.

The business meeting was followed by an illustrated lecture by Prof. R. H. Kelty, State Apiculturist, of Michigan. Other visitors were W. A. Weir, Secretary-Treasurer of the Ontario Honey Producers' Cooperative and Herbert Link of LaPorte, Indiana.

A meeting was held at the Bismarck Hotel, the evening of April 7. Outdoor meetings were held during the summer months at the apiaries of Mr. Frank Hofmann on July 26 and at Jean's apiary near Byrnville on June 28, which were well attended as the average attendance was approximately 75.

We were favored with speakers at our outdoor meetings who are outstanding men in the bee industry, these speakers being Mr. E. W. Atkins at the Frank Hofmann Apiary and Mr. A. G. Gill, Mr. C. L. Duax and Mr. Wm. C. Young at Jean's Apiary. In addition to delivering a very interesting talk, these men left valuable information with the

* The numbers in parentheses ( ) following the name of the local association indicate the numbers of local association members affiliated with the Illinois State Beekeepers' Association during the periods between annual conventions, that is from December 3, 1929 to November 18, 1930 and from November 18, 1930 to November 17, 1931, respectively. Members at large from these particular counties are not included in these totals.

** A secretary's name appearing under the name of the association indicates that a separate annual report was furnished by the local secretary. Otherwise, the information given has been compiled from previous individual reports as published in the Association Bulletin.

beekeepers pertaining to the value of bees to agriculture, bee management, and marketing.

Last but not least, our Chairman of the refreshment committee, Mr. Wm. C. Young, handled his part of the meetings so successfully that refreshments were left over after all had enjoyed them to their capacity. We also are indebted to the ladies of our Association for making possible this abundance of good things to eat.

In addition to our elected officers and the refreshment committee, we had two other committees; namely, the Publicity Committee, the Chairman being Mr. Everett Warren, and the Legislation Committee, the Chairman being Mr. J. R. Wooldridge. Both of these committees performed their duties with a benefit to the Association and the industry as a whole.

The first meeting of 1931 was held at the Bismarck Hotel, Chicago, on the evening of February 13, and officers were elected as follows: President, Mr. C. L. Duax; First Vice-President, Mr. Wm. Bigel; Second Vice-President, Mr. Ed. Groh; Third Vice-President, Mr. Adam Bodenschatz; Fourth Vice-President, Mr. Frank Hofmann; Fifth Vice-President, Miss Anna Krier; Secretary and Treasurer, Mr. E. J. McCormick.

The business meeting was followed by the speaker of the evening, Mr. V. G. Milum, who was on his return trip from the International Convention of the American Honey Producers' League which was held at Toronto, Canada. Mr. Milum presented the work of the American Honey Institute and their aid in promoting the sale of honey. The members responded by contributing sixty-one dollars ($61.00) at this meeting for the support of the American Honey Institute.

Our spring meeting was held April 20, at the Bismarck Hotel, the speakers and entertainers being members of our Association. Mr. J. R. Wooldridge told us about the work of the bee inspector, and answered questions pertaining to this subject. Mr. W. C. Young spoke on Improvements in Bee Equipment; Mr. A. G. Gill gave a very interesting talk on Marketing Honey. We also enjoyed a musical program. Mrs. Evelyn Mitchell rendered piano selections, while vocal solos were given by Miss Anne McCormick and Mr. Everett Warren.

Out-door meetings were held during the summer months, the first being held July 11, at the Louis Bacle Bee Farm, with Mr. A. L. Kildow, our State Bee Inspector being the speaker. Our President, Mr. C. L. Duax, suggested having a question box; questions turned in were read off and any beekeeper present was invited to speak on the subject, and some very interesting points were brought out. Mr. Adam Bodenschatz demonstrated hive manipulation for producing comb honey and extracted honey. Refreshments included honey-ade, and some brought cake and cookies made with honey.

The second outdoor meeting was held August 15, in the J. D. Zook's Peony Gardens, in LaGrange, Illinois. Mr. J. Frank Haan was the main speaker, and his talk to the beekeepers assembled, which numbered approximately one hundred, was enjoyed by all. Mr. J. R. Wooldridge also urged the members to arrange a display for the State Fair. Ice cream made with honey, fresh peaches and real cream were served along with other refreshments.

DeKalb County Association (18-10).
(C. H. Tudor, Sycamore, Secretary.)

Our Association held three meetings in 1930—one at DeKalb on March 21, and two field meetings, one July, the other in August, with good attendance at all.

Our officers for the year were: President, Roy Thompson, Sycamore; Vice-President, Ross Morrill, Batavia; and C. H. Tudor, DeKalb, Secretary.

Our 1930 annual meeting was held at DeKalb, December 15, 1930, with election of officers as follows: Roy Thompson, President; Ross Morrill, Vice-President; C. H. Tudor, Secretary-Treasurer.

Two field meetings were held in 1931, one in Kane County at the Ross Morrill home, where Mr. Gill and Mr. Everett Warren of Chicago each gave us a fine talk. The other meeting held at Roy Thompson's home in DeKalb County, September 13, was enjoyed by all. Mr. Warren, present at this meeting, presented the subject, "Where the Beekeeper's Profit Is." These meetings are an all day affair with a pot luck dinner with ice cream and melons for trimmings.

At our last meeting the tax question was brought up again. We still think it a good thing. There is no tax on bees in Illinois. Because a man pays taxes on his land that does not include his dog, horse, cow, or bees. We of our Association do not object to the small beekeeper if he is such but the kind that keep bees in barrels, boxes, and cross comb hives loaded with American foulbrood are the ones that a heavy tax ought to be put on. Mr. Dillon of Michigan has the right idea on the foulbrood treatment.

In 1923 an inspector from the south part of the State visited DeKalb. At that time there were over four hundred hives of bees kept within the city limits, three beekeepers having about three hundred and fifty of these and never being able to keep free from American foulbrood. These three fellows and the Inspector worked a week in and near DeKalb and burned 161 American foulbrood stands. Now in my work as an Inspector of two counties with 3,000 swarms I have burned 162 this year. If some one can suggest a way to teach Tom, Dick, and Harry that bees must not be kept in any old box and that bees must be taken care of and no foulbrood allowed, then, we of DeKalb County will gladly shake them by the hand.

The 1931 annual meeting was held on December 15, 1931.

Ford County Association (0-8).

This association was organized at a meeting held at the courthouse at Paxton, Friday, March 6, 1931, with the assistance of Mr. W. F. Purnell, County Farm Adviser, Chief Inspector, A. L. Kildow, and V. G. Milum. Officers selected were F. W. Tieken, Piper City, President; Gilbert Word, Gibson City, Vice-President; and C. E. Harper of Paxton, Secretary-Treasurer.

Franklin County Association (10-1).

After a period of inactivity since 1926 so far as affiliation of members with the State Association is concerned, this association reorganized in 1930 and affiliated its members. New officers selected are as follows:

President, ————————; Vice-President, Albert Criley, Thompsonville; Secretary-Treasurer, John Matelic, West Frankfort.

Beekeepers of this county met at the high school at West Frankfort the evening of March 27, 1931. Chief Inspector, A. L. Kildow and V. G. Milum attended this meeting as speakers. Music was rendered by the High School Music Club at the beginning of the program and refreshments were served by the cooking classes at the close of the meeting.

Only one member was affiliated in 1931.

Fulton County Association (8-8).

(J. E. Watts, Canton, Secretary; Dr. J. E. Aigley, Farmington, Treasurer.)

A bee and honey exhibit with prizes was given at the fall festival at Farmington on September 25 and 26, 1930.

Grundy County Association.

The association has not been active since 1929 but through the assistance of C. J. Anderson of Morris there were nine members at large for 1931, and nine were again listed as members for 1932 at the last State Convention through Mr. Anderson's efforts.

Hancock County Association (1-12).

(M. G. Dadant, Hamilton, Secretary.)

No meetings reported for 1930 and 1931.

Henry County Association (28-33).

(Elmer Kommer, Woodhull, Secretary.)

One field meeting was held in Henry County during 1930; this one being at the apiary of Howard Wilson, Geneseo, on April 24. The speakers were F. C. Pellett, Hamilton, Illinois; A. L. Kildow, Chief Inspector, Putnam, Illinois; and Dr. R. C. J. Meyer, Hillsdale, Illinois. Owing to the busy season, this meeting did not have as large an attendance as we generally have.

Our annual meeting was held at the court house in Cambridge on October 2, and the following officers were elected for the year: President, H. H. Wilson, Geneseo; Vice-President, Ed. Kommer, Cambridge; Secretary, Elmer Kommer, Woodhull; Treasurer, A. E. Swanson, Hooppole; Directors, A. A. Anderson, Kewanee, P. A. Carlson, Galva, and W. L. Myers, Geneseo.

Dr. R. C. J. Meyer and S. F. Peterson, President and Secretary of the Rock Island County Association were with us at this meeting and gave good talks, and Mr. Peterson suggested that we try and get two other county associations to go in with us next year and have a series of four meetings, one in each county and thus save expenses. Dr. Myers spoke on preparing honey for market, and had some very good suggestions to offer.

This Association is now on its eleventh year since it was organized and Mr. A. E. Swanson has served as its Treasurer since the start.

The following officers for the Henry County Honey Producers' Association were elected October 1, 1931: President, H. H. Wilson,

Geneseo; Vice-President, Ed Kommer, Andover; Secretary, Elmer Kommer, Woodhull; Treasurer, P. A. Carlson, Galva; and Directors, Lawrence Peterson, Kawanee; Eskil Magnuson, Galva; W. L. Myers, Geneseo.

Our county association did not hold any field meeting this year as is customary, as the honey flow was very spotted, and those who did get a crop were those fortunate in moving their bees to sweet clover where a little better than 50 per cent of a crop was harvested.

The annual meeting was held on October 1, 1931, where a good meeting was had, those present being favored with excellent talks. G. H. Cale, from the American Bee Journal, Hamilton, Illinois, spoke on "What Makes a Beekeeping Location." His subject had some valuable points for the beekeepers of Henry County. M. G. Dadant of Hamilton, Illinois, spoke on "Present Conditions With the Beekeepers." His subject covered a lot of ground and really led us to believe that we are not hurt as bad on prices of honey as some of the other farm products, which have fallen considerably more than honey has. Mr. A. L. Kildow, Putnam, Chief Inspector, spoke on membership and on disease among bees. He urged all beekeepers to keep a watch in their own apiaries for disease and not wait for the inspector to come and find it for them. He also asked this county association to try for more members as a move was on hand to make the State Association to grow up to 1,000 members before another year was past.

We also had present, Mr. Greer of Joy, Illinois, who is President of the Mercer County Beekeepers' Association and Everett Price of Toulon, Illinois, who is Secretary of the Stark County Honey Producers' Association, which was formed this year. They have an active bunch of beekeepers over there and we are expecting that association to grow.

Our association voted to send $10.00 to the American Honey Institute to help advertise honey.

The Henry County Fair Board withdrew the $50.00 appropriation for honey premiums for 1931, but the President of the Association appointed a committee of three to meet with the Fair Board to see if honey cannot be exhibited in 1932 with a reasonable appropriation for premiums.

Iroquois County Association (10-11).

The 1930 annual meeting was held February 11, with the 1929 officers being reelected as follows: President, J. N. Koritz, Buckley; Vice-President, H. L. Dunn, Onarga; Secretary-Treasurer, L. W. Wise, Watseka.

This association held its 1931 annual meeting at Watseka February 10, the following officers being elected: President, J. N. Koritz, Buckley; Vice-President, John Curphy, Onarga; and Secretary-Treasurer, H. L. Dunn, Onarga.

Jefferson County Association (4-10).

(C. F. Anderson, Mt. Vernon, Secretary.)

A meeting was held on January 25, 1930, at the Mt. Vernon high school in connection with the agricultural classes. V. G. Milum spoke to the Agricultural Association and to a later group of beekeepers.

JERSEY COUNTY ASSOCIATION (18-8).

(C. A. Mackelden, Jerseyville, Secretary.)

JODAVIESS COUNTY ASSOCIATION (17-15).

The annual meeting was held on January 18, 1930, with election of officers as follows: President, Chris Duerrstein, Galena; First Vice-President, Chas. Knantz; Second Vice-President, Henry Ammon; Secretary-Treasurer, Edward Jeffrey, Galena.

On April 26 a meeting was held at the apiary of J. T. Gundry of Warren, with Mr. Kildow and Mr. Frank Pellett as speakers.

The 1931 annual meeting was held at Galena, January 24, the 1930 officers being re-elected. General beekeeping problems were discussed.

LASALLE-BUREAU COUNTY ASSOCIATION (0-22).

This association was organized on January 21, 1931, with eleven charter members. Officers elected were Fay Rumery, LaSalle, President; Edward Kobold, Peru, Vice-President; and Henry W. Hoffman, Peru, Secretary-Treasurer.

A second meeting was held at the Ottawa Farm Bureau, March 2, with Chief Inspector, A. L. Kildow, and V. G. Milum as visiting speakers.

MCHENRY-LAKE COUNTY ASSOCIATION (62-84).

(C. P. Jankowski, Gurnee, Secretary.)

This association took on renewed vigor at a meeting on March 22, 1930, at which time Mr. John McDonald, Jr., of Richmond was elected President and Ray Page of McHenry, Secretary-Treasurer. A. L. Kildow, Chief Inspector, and V. G. Milum appeared on this program. It was at this meeting that Lake County was added to the association name and its beekeepers welcomed into the organization.

Mr. Ray Page, Secretary in 1930, reported a good meeting at the home and apiary of A. Paddock of Round Lake, on August 30, 1930. Chief Inspector, A. L. Kildow and E. W. Atkins of the G. B. Lewis Company gave talks.

This association held two meetings during the year of 1931. A business meeting was held on April 21, 1931, at the high school at Libertyville with an attendance of about 30 people. An election of officers was held and the following persons were elected: Mr. E. M. Klein, Gurnee, President; Mr. H. W. Jones, Cary, Vice-President, and C. P. Jankowski, Secretary-Treasurer. There were two very good speakers at this meeting, Mr. A. L. Kildow and Mr. A. G. Gill.

The second meeting of the season was held at Mr. H. W. Jones' place in Cary, Illinois, on August 9, with an attendance of about 35 people. At this meeting we had a very interesting speaker, Mr. Ritter of Genoa, who explained the difference between American and European foulbrood. Following Mr. Ritter's talk three other short talks were given by the following: Mr. H. W. Jones, Mr. E. M. Klein, and Mr. C. P. Jankowski.

This association has 84 members now but just watch and see what it will be next year—1932.

McLean County Association (11-19).
(Glenn L. Hargitt, Danvers, Secretary.)

The McLean County Beekeepers' Association held its first 1931 meeting at the Farm Bureau Building in August.

The association reorganized and elected the following officers: Harry J. Bryan, Normal, President; John H. Bright, Normal, Vice-President; Glenn L. Hargitt, Danvers, Secretary-Treasurer; W. B. Brigham, Bloomington, Assistant Secretary-Treasurer; Ed. C. Heldt, Randolph, Subscription Secretary.

Plans were made for a field meet on September 11. A short talk was given by the Secretary on the value of sweet clover as a honey crop.

On September 11 a field meeting was held at the home of the Vice-President, John H. Bright of Normal. V. G. Milum gave an interesting discussion on bees in general pertaining to the characteristics and habits of bees.

After a treat of muskmelons and watermelons, furnished by the Vice-President, we went to the home of W. S. Dorland, Normal, where an exhibition and discussion of American foulbrood was held.

Macon County Beekeepers' Association (0-50).
(G. Murray Morris, Decatur, Secretary.)

The Macon County Beekeepers' Association was organized January 5, 1931, and has held regular meetings the first Monday night of each month since.

The charter was opened with nine members and grew rapidly until by midsummer the membership reached fifty—the largest single county unit in the state.

The officers for 1931 are as follows: President, A. R. Parish, Decatur; Vice-President, O. E. Waymire, Decatur; Secretary-Treasurer, G. Murray Morris, Decatur.

These men are all practical beekeepers and produce honey on a commercial scale. Under their leadership the attendance at meetings gradually increased with additional new members being added every meeting night. They have encouraged the membership to use the latest proven methods in their apiaries and have brought in many outside speakers of note, including A. L. Kildow, V. G. Milum, (August 17), and others. Visitors from other counties are always present because they have found these Macon County meetings to be a fine source of information. The association gives special attention to beginners and numbers a great many such among its members. Live bees, in one form or another are usually on display at the meetings.

To O. L. Stone, the local inspector, goes much credit for this thriving, live wire organization. His services are always available to the members. He is already recognized as one of the most efficient inspectors in the service today. There is no apiary where he is not welcome and there is no question too great or too small for his storehouse of bee knowledge.

On May 17, a bee tour was conducted where demonstrations were given, speeches made and ice cream and cakes consumed in great quan-

tities. Honey foods were served and described also on these tours. A visitor to Macon County need not seek out any special apiary but is welcome at any or all and will find the industry being conducted with interest and along scientific lines.

This young organization offers no apologies for its exhibit at the Illinois State Fair. Description is unnecessary for those of you who had the privilege of visiting the booth. Mr. Earle of Dalton City had full charge of the booth and aside from carrying off a good share of the prizes, he made many friends for the association. The exhibit demonstrated one fact, that is that the Macon County Beekeepers' Association will have to be reckoned with in future exhibits.

Yes, here is an association that is "going places" and "doing things" and will, in all probability double its membership in "32".

Mercer County Association (15-0).

The 1930 annual meeting of this association was held on September 9, the following officers being elected: President, R. M. Greer, Joy; Vice-President, Harry U. Decker, Aledo; Directors, H. E. Miller, C. W. Brown and A. N. West, all of Aledo; and Will C. Egbert, Secretary-Treasurer.

Maurice Dadant of Hamilton was the outside speaker at a meeting on October 2, 1931. The association expected to subscribe $5.00 to the American Honey Institute.

Montgomery County Association (16-16).
(W. W. Osborn, Hillsboro, Secretary.)

This association held meetings at Hillsboro on April 2 and May 21, 1930, with the old officers as follows being retained: O. W. Kennett, Ohlman, President; Geo. H. Hill, Hillsboro, Vice-President; and W. W. Osborn, Hillsboro, Secretary-Treasurer.

At a meeting at the home of the Secretary at Butler on the evening of May 12, 1931, all officers were reelected for another year. Another meeting was held on June 16 at Chamber of Commerce rooms in Hillsboro.

An enthusiastic meeting and tour was held on October 6, starting at the apiary of L. H. Reents in Litchfield at 10 o'clock, continuing on to Butler for a fish dinner given by some organization. The beekeepers' association served honey sundaes to each diner accompanied by a card bearing the following notice: "This honey sundae is served with the compliments of the Montgomery County Beekeepers' Association. We hope that you like it. Use more Honey, Nature's most healthful and wholesome sweet."

Following the fish dinner the group of beekeepers drove on to the apiary of W. W. Osborn, the Secretary. Here the crowd was hemmed in by the rain and the other apiaries were not visited. As a result there were numerous discussions concerning methods of beekeeping and the control of bee diseases. Visitors from a distance were C. E. Hill, Secretary of the Shelby County Association, and Mr. Wall of Windsor.

Morgan-Scott County Beekeepers' Association (0-16).
(L. W. Fisher, Woodson, Secretary.)

This association was organized on December 12, 1930, with the following officers: Mr. T. A. Reeve, Jacksonville, President; W. G. Duckwall, Lynnville, Vice-President; L. W. Fisher, Woodson, Secretary-Treasurer.

Meetings were held at the Farm Bureau at Jacksonville on January 8, February 12, March 5, and April 3, 1931. At one of these meetings Mr. H. B. Corrie, agricultural instructor at Winchester High gave a very interesting talk on the care and production of bees and honey, which he covered in a very careful manner, showing he had spent considerable time in preparing.

At another meeting Mr. A. L. Holmes made a very interesting talk on bee diseases.

On May 1st a meeting was held at the Wm. Mueller Apiary at Bluffs and then adjourned to the high school laboratory where a large number of slides on the beekeeping industry were shown. They proved very interesting and instructive. Mr. J. H. McClure proceeded to transfer an old style box hive of bees into a modern hive.

Mr. H. Corrie of Winchester gave a talk on swarm control at the June meeting held at the Farm Bureau at Jacksonville.

At a meeting on September 24th at W. A. Duckwall's Apiary, Lynnville, the President of the State Association was in attendance. The inspector for the district made a talk detailing how much progress was being made towards the eradication of American foulbrood in the district.

Our last meeting of the year was held at the high school at Bluffs on November 12.

North Central Meeting.

A well attended all day field meeting was held at the apiary and home of Chief Inspector and Mrs. A. L. Kildow on September 10, 1931. One hundred beekeepers were present representing twenty counties of the state and twelve of the forty-six deputy apiary inspectors.

Speakers on the program were Mr. Stuart E. Pierson, Director of Agriculture, Mr. Reeder, Dr. R. C. Myers of Rock Island, Mr. Kildow, Mr. M. G. Dadant and Mr. Frank C. Pellet of Hamilton, Illinois.

The Ogle-Lee County Association.
Tri-County Association (12-13).
(Elizabeth Ordnung, Oregon, Secretary.)

The Ogle-Lee County Beekeepers' Association held two meetings during 1930, on March 22 and the annual meeting September 17.

State Association Secretary, V. G. Milum, and Chief Inspector, A. L. Kildow, were present at the March meeting.

The 1930 officers were: President, S. S. Claussen, Oregon; First Vice-President, Charles Mon, Polo; Second Vice-President, Clyde Wilde, Oregon; and Secretary-Treasurer, Elizabeth Ordnung, Oregon.

The Ogle-Lee County Beekeepers' Association held two meetings in 1931—April 23 and September 16. Chief Inspector A. L. Kildow and

Chief Inspector of Apiaries, A. L. Kildow, Putnam, Illinois and Director Stuart E. Pierson, Department of Agriculture, Springfield, Illinois.

Beekeepers at meeting at home of A. L. Kildow, Putnam, Illinois, September 10, 1931.

A. G. Gill of the A. I. Root Company attended the April meeting. Mr. Kildow and wife were present in September.

The officers for the ensuing year are: President, Chas. Mon, Polo; First Vice-President, Clyde Wilde, Oregon; Second Vice-President, Tom Bedoes, Rockford; and Secretary-Treasurer, Elizabeth Ordnung, Oregon.

At the September meeting the association decided to include Winnebago County in the organization and the name to be Tri-County Beekeepers' Association. A captain was appointed from each county to interest beekeepers in the association, and thereby gain new members.

At the April 23 meeting the association voted $2.00 to the support of the American Honey Institute and recommended that all members pay $1.00 per thousand pounds of honey for this worthy enterprise.

Peoria County Association (17-14).

(Mary F. Johnson, Peoria, Secretary.)

After a year of inactivity this association was revived at a meeting on March 10, 1930. Officers elected were Myron B. Shoff, Peoria, President; C. G. Strieder, Brimfield, Vice-President; Edward Lehman, Peoria, Treasurer; and Mary F. Johnson, Peoria, Secretary.

A field meeting with a picnic dinner was held at the home and apiary of Deputy Inspector and Mrs. B. F. Bell of Kingston Mines on June 16, 1930. Mr. Kildow and Mr. Milum gave discussions while Mr. Bell gave a demonstration of transferring bees from a box to a modern hive.

A field meeting was held at the apiary of C. G. Strieder of Brimfield, August 11, 1930, with M. G. Dadant as the visiting speaker.

We have held eight regular monthly meetings in 1931 on the first Monday of each month at the Peoria County Farm Bureau at 7:30 o'clock.

We held one field meet in July, 1931, at County Inspector B. F. Bell's home at Kingston Mines with an attendance around 30. We held another field meet at C. G. Strieder's home at Brimfield on August 3 with a nice crowd on hand.

Our State Inspector, Mr. Kildow, of Putnam, and the Dadants of Hamilton, Illinois, were at both meetings with helpful discussions. Mr. A. G. Gill of the A. I. Root Company of Chicago gave a very concise analysis of sales and prices current in Illinois on both comb and extracted honey.

Several of our members went to Putnam for the September meeting and others are going to the State meeting at Springfield in November. Altogether we have had a regular and interesting lot of meetings.

Piatt County Association (18-12).

The 1930 annual meeting of this association was held at Monticello, January 20, with A. G. Gill of Chicago and V. G. Milum as the speakers.

The 1930 officers selected were: Scott Piatt of Monticello as President; C. W. Brown, Monticello, Vice-President, with Deputy Inspector Emory Warner being retained as Secretary-Treasurer.

No activity for 1931 was reported.

Rock Island County Association (28-30).

We held our 1930 annual Rock Island County Beekeepers' meeting on September 17, at John F. Johnson's Apiary, Hampton, Illinois. This was a very successful meeting, and at that time, we elected the following officers: President, Dr. R. C. Meyer, Hillsdale, Illinois; Vice-President, John Gasnow, Moline, Illinois; Secretary, S. F. Peterson, East Moline, Illinois; Treasurer, Thos. J. Hayes, Taylor Ridge, Illinois; one new Director, C. C. Trowbridge, Hillsdale, Illinois.

We had an attendance of about 55 men and women. It was an all-day affair with a good fish-fry for dinner, at which we consumed 50 pounds of fish.

I have made a personal survey of the members of our association and find that they have had a very successful year, although we have had some foulbrood. A few of our members have had to destroy a lot of colonies.

The Rock Island County Beekeepers' Association held its 1931 annual meeting at Lawrence M. Weiss' Apiary, Taylor Ridge, Illinois, Friday, September 11, 1931.

The ladies furnished a fine fried spring chicken dinner, with an attendance of about sixty.

After the dinner many different topics were discussed to help some of our new beginners on beekeeping, the older members offering their help to the beginners. We had with us the following speakers who gave us some very good talks on beekeeping and also other topics: A. L. Kildow, Chief State Apiary Inspector, Mr. H. C. Dadant of Hamilton, Frank C. Pellett of Hamilton and Dr. R. C. Meyer of Hillsdale.

The association voted to donate $5.00 to the American Honey Institute. We had brother beekeepers from adjoining counties and also Mr. Hartman and others from the Stephenson County Association.

The following officers were elected: Dr. R. C. Meyer, Hillsdale, President; John Gasnow, Moline, Vice-President; S. F. Peterson, East Moline, Secretary; Thos. J. Hayes, Taylor Ridge, Treasurer; Robert R. Atkinson, Port Byron; Lawrence M. Weiss, Taylor Ridge, and J. W. McKenrick, Silvis, Directors.

Saline-Gallatin County Association (22-24).

(Alvin Bell, Ridgway, Secretary.)

We held our 1930 annual meeting at Equality High School on January 23 with 30 present and with V. G. Milum as the speaker. The election of officers resulted in choice of H. W. Wilson of Eldorado as President; Norval Bean, Eldorado as Vice-President; and Alvin Bell as Secretary.

On April 26, 1930, this association held a meeting at the home of Ora Funkhouser of Eldorado.

We did not have any honey flow in either county until August, 1930, but it lasted until frost, giving us a normal crop for the year.

The 1931 annual meeting was held at Equality Township High School on the afternoon of Friday, March 27. Ora Funkhouser of Eldorado was elected as the new President, Kelley Moye of Omaha as

Vice-President and Alvin Bell of Ridgway was reelected as Secretary Treasurer. V. G. Milum of the University of Illinois and Chief Inspector A. L. Kildow appeared on the program.

Meetings were held on May 22 at the home of the Secretary, Alvin Bell of Ridgway, and on June 25 at the apiary of Rex Stricklin of Eldorado.

On Saturday August 15, 1931, a meeting was held at the home of Victor Lamandin of Eldorado.

Mr. Ora Funkhouser, President, gives us the following regarding the honey crop for 1931:

"This has been our best season since my starting with the bees. After a dry spring sweet clover started to produce and I received a good crop off that source, my record hive storing more than 250 pounds.

"Then came blue vine (climbing milk weed) for the second straight year with a bumper crop, to those who had bees located on the lower black bottom land. Then it was a continuous honey flow from golden rod, spanish needle, smart weed, and asters till frost.

"My record colony which wintered over in one hive body and then rented to the orchardists this spring stored approximately 270 pounds shallow frame comb honey and 130 pounds extracted honey and had to build one hive body from foundation making 400 pounds for the colony and left one-half extra hive body of honey for winter this fall.

"My crop this year for 34 hives spring count was about 3,100 pounds or about 92½ pounds per colony average on all locations combined. From all reports the other beekeepers around here have made good yields also."

Shelby County Association (1-23).
(C. E. Hill, Windsor, Secretary.)

Officers of this association are President, Frank Koontz, Stewardson; Vice-President, P. L. Chesterman, Tower Hill and Secretary-Treasurer, C. E. Hill, Windsor.

This association was reorganized on May 23, 1931, after a temporary lapse in activities from 1928 when first organized.

A meeting was held on July 18, and again on July 31, with Chief Inspector, A. L. Kildow discussing bee diseases and treatments and general management of bees at the latter meeting.

At a meeting on August 14, Deputy Inspector, O. W. Kennett of Ohlman was the principal speaker.

The regular meetings are held on the last Friday night of each month.

Deputy O. L. Stone of Decatur inspected 1623 colonies in nearly 300 apiaries in Shelby County in 1931, finding considerable foulbrood in the southeast part of the county.

Stark County Association (0-16).

Although some beekeepers of this county had been members of the neighboring Henry County Association, a separate association was first organized on July 9, 1931. Officers elected were C. W. Gerard, Elmira,

President; Everett Price, Toulon, Secretary; A. C. Cooper, Wyoming, Treasurer; and Frank Johnson and Grover Hollars, Toulon, and Carl Reed, Elmira, as Directors. Chief Inspector, A. L. Kildow and Deputy Elmer Kommer were the speakers. Another meeting for August 15 at Wyoming was planned.

A meeting was held at Toulon on October 2 with Mr. Cale and Mr. Kildow as speakers.

Stephenson County Association (10-14).

A meeting was held at the court house, Freeport, October 4, 1930, August 9, 1931 and again at the court house at Freeport, Saturday, October 3, 1931, with Mr. Cale and Mr. Kildow as visiting speakers. Deputy Inspector Schaeffer reported examining 1867 colonies on a partial survey of the county, finding 19 with American foulbrood.

Northwestern Independent Association (10-4).

This association consisting of beekeepers living in Stephenson County did not report any activity for 1930 or 1931.

Warren County Association (10-10).

(Glenn Glass, Secretary, Cameron.)

Our report for 1930—The same officers are serving another year. A. L. Quinley of Cameron is President; Howard VanTine of Monmouth and John Keenan of Galesburg are the Vice-Presidents; and Glenn Glass of Cameron is Secretary-Treasurer.

The summer of 1930 will be long remembered as the hottest, driest summer in many years. But during the early part of the season before the drouth set in the bees stored considerable surplus. Honey prices however have sagged along with the trend of the times and beekeepers in this locality are taking less for their honey than any time since the World War.

Bees have gone into the winter in good condition and plentiful stores in this county.

Whiteside County Association (0-4).

A meeting at the H. C. Rodermacher apiary at Morrison was reported as being held April 25, 1930.

The four members listed for 1931 were members-at-large. Apparently there were no 1931 activities.

Will County Association (13-13).

(A. J. Polcyn, Joliet, Secretary.)

This association was revived in 1930 at a meeting on January 12. Our 1931 officers are: Mrs. Edward Winkler, President; G. Lynn, Lockport, Vice-President; and A. J. Polcyn, Joliet, Secretary-Treasurer.

We had a meeting May 2 which was well attended and conditions were discussed. As we did not have any state inspectors in the field for Will County we tried to hold up our end just the same to save ourselves.

The 7th of June we held another meeting and received some new members so we have been progressing this year more than any other year in spite of the small honey crop we got. Some got more than others but still it was smaller than last year.

We held a picnic at Wm. Voight's place at Monee and had a very good time. We make up meetings at homes of different members to make it more binding with the association.

We hope to have a chance to get some inspection for next season as it helps a great deal.

Woodford County Association (18-13).

(Alfred Thomas, Secor, Secretary.)

The past year of 1930 seems to have been a very good one for most Woodford County beekeepers in regard to the production of honey. Although we have had one of the most severe drouths in years the sweet clover seemed to yield a large amount of nectar.

Having secured a good crop of honey, the disposal of the crop at a profit seems to be a big question. However, I think that honey is selling in line with most farm products, such as cream, butter and eggs.

On September 26, 1930 we held an outdoor meeting at the home of Benj. Fischer, Roanoke, with good attendance. Henry Dadant of Hamilton, was the principal speaker of the day, his subject being "Bee Behavior in Comb Building."

This association held its 1931 annual meeting and election of officers at the High School at Eureka, March 6th. Mr. B. F. Bell of Kingston Mines was present and outlined his experiences and his system of beekeeping. Mr. J. P. Scheid of Eureka and Alfred Thomas of Secor were re-elected President and Secretary-Treasurer, respectively. Mr. Virgil Rocke of Eureka was elected Vice-President.

A field meeting was held at the Rocke Brothers Apiary, Eureka, on September 12. Mr. V. G. Milum and A. L. Kildow were present and spoke at the meeting. (Those present were much interested in the honey house and its equipment as demonstrated by Rocke Bros.)

ANNUAL REPORT OF THE CHIEF INSPECTOR OF APIARIES FOR THE YEAR ENDING JUNE 30, 1930.

(A. L. KILDOW, Putnam, Illinois.)

To the Honorable, Louis L. Emmerson, Governor of the State of Illinois.

SIR: I have the honor of hereby submitting my annual report, as State Inspector of Apiaries, showing work done during the year ending June 30, 1930.

In submitting my annual report I wish to state that it is a summary of the work done, and that we followed last year's plan of responding to calls for help and going into localities where we were satisfied disease existed. In most cases the burning plan was used, as our experience proves that to be the only sure method.

Chas. Reese, State Apiarist of Ohio has this to say, "If all the various methods of control and treatment advanced for the past half century, had been successful to any degree, American foulbrood would be past history rather than the greatest issue, at present in American beekeeping. Of all the many procedures advocated by their respective proponents so far, there is one and only one absolutely positive method to eradicate American foulbrood, and that is the present policy of destroying by fire all infected materials by a trained inspector. Experience has clearly demonstrated it is absolute folly to permit individuals to treat infected colonies."

In this spring's work we took in considerable new territory, most of which was so badly infected that without the assistance of an inspector, the bees would, in a short time, have been at least two-thirds gone leaving the remainder in a diseased condition.

We visited 7,685 apiaries with 90,581 colonies and found 6,231 colonies diseased. Of these diseased colonies 2,791 were destroyed. Only a very small percent were in condition to admit of treatment. It is impossible for the inspectors to take care of all the bees in the State but they can and do instruct and help the beekeeper to become able to detect disease and to burn the infected material. Thus the beekeeper becomes an inspector of his own apiary.

Instructions given to those having diseased apiaries varies somewhat as each apiary is an individual problem. Where the inspectors have worked the beekeepers have learned that the inspector does not come to destroy more than is necessary, but really comes to assist him that he may keep bees better and get better returns from his labor.

The Third Annual Bee Tour occurred in July, 1929. On July 24, the beekeepers assembled at the apiary of Maxel Mapes of Paris,

and after discussing important subjects and viewing Mr. Mapes' apiary, the caravan proceeded to visit Chas. Kruse of Paris, one of the big comb honey producers of the State. Mr. Kruse explained his method of handling bees for comb honey. From there the tour proceeded to Robinson, where Herman McConnell, the foremost queen breeder of Illinois explained his method of queen rearing. Then Jay Smith of Vincennes, Indiana, was visited, as he is an authority on bee matters.

The second day we visited apiaries at Mt. Carmel, Carmi, Cottonwood, Ridgeway, and Eldorado. At Cottonwood the benefit of bees to the orchardist was shown by Raymond Hale, the apple grower.

The third and last day was full of speeches, talks, and sights from apiaries at Harrisburg, Elkville, Duquoin, Mulkeytown, Christopher, Whittington, and Mt. Vernon. At Mt. Vernon there was an evening session. There were many good beekeepers in southern Illinois that it was impossible to visit on this tour. Speakers accompanying the tour were V. G. Milum, Apiculturist of the University of Illinois, Frank Pellett, Associate Editor of the American Bee Journal and A. L. Kildow, Chief Inspector.

August was a busy month for the commercial beekeeper as the honey crop was to be taken care of and many of the beekeepers were getting ready to exhibit their products at the State Fair. This exhibition, which was the largest and best ever shown at the Fair, spoke louder than words, that the beekeepers were advancing and raising a better quality and larger crops of honey than ever before. This plainly shows that foulbrood is being taken care of and controlled. Another good feature was the Information Bureau where competent beekeepers were ready and willing to answer all questions and explain the workings of the bees.

As the fall drew near, the inspectors were busy making their fall check-up on disease, and the beekeepers were busy taking care of their fall crop and preparing their bees for winter.

The educational part continued while the bees rested. Many beekeepers attended the Annual State Convention at Springfield in December to listen to the speakers and take part in the discussions or to propound their perplexing questions to the more experienced beekeepers.

A number of county meetings were held during the winter and spring. Among the more important were the ones held at Woodstock, March the twentieth, DeKalb, the twenty-first, and Oregon, the twenty-second. As a result of the Woodstock meeting, McHenry and Lake counties united and formed an organization with a large membership. These counties were badly infected with American Foulbrood and had for some time clamored for help, so it was arranged to hold a series of three meetings in this part of the State. V. G. Milum, State Secretary, and A. L. Kildow, State Inspector, went to their assistance and succeeded in completing the organization and through the Department of Agriculture they secured two inspectors for Lake County and one for McHenry.

These inspectors are real live, practical beekeepers and have gone into the work to clean up the disease in order to protect the bee industry. This territory is comparatively new in the work of eradication of dis-

ease and the inspectors are doing their best to make a thorough clean up. One inspector found 200 cases of American Foulbrood in 815 colonies, of which he burned 157. The other inspectors are meeting with about the same conditions, so it is very evident that our percent of disease will be higher this time, with prospects of a general clean up.

Peoria County association was reorganized on March 10. At this time there were a goodly number in attendance. This association planned for monthly meetings and a field meet in June.

The three day tour of Geneseo, Morrison, and Warren was a success. Frank Pellett of the American Bee Journal, Dr. R. C. Meyer of Hillsdale and Inspector Kildow were present at the meeting at the apiary of H. H. Wilson of Geneseo on April 24. Dr. Meyer gave a very interesting and practical talk on the need of the honey bee in the raising of fruit. Dr. Meyer is a tester of fruit and shrubs on an experimental farm at Hillsdale.

The 25th we were at Morrison and visited the Lee Horning apiary which is undoubtedly the prettiest apiary in the State. This apiary is well arranged and kept in the best of condition and Mr. Horning reaps a benefit from his bees.

We then proceeded to the apiary of H. C. Rodemaker where a large number of beekeepers were assembled and the discussions were mostly on the subject of organizing to get a better way of disposing of the honey crop and meeting competition. The next day took us farther north into JoDaviess County. Here the meeting, attended by both ladies and gentlemen, was at the apiary of J. T. Gundry. Mr. Pellett gave a very interesting talk and those present expressed themselves as highly benefited by the meeting.

Montgomery County held its annual meeting April 2, elected officers and planned for a meeting May 21 at the Farm Bureau office.

June 16, the Peoria County beekeepers had their field meet at the apiary of B. F. Bell of Kingston Mines. This was well attended and V. G. Milum and Inspector Kildow were present. Besides the addresses and answering of questions there was an actual demonstration of transferring a colony of bees from an old box to a modern hive. This was done by Mr. Bell. At the noon hour all enjoyed a basket lunch.

Thus our year of clean up, educational meetings and demonstrations drew to a close, and we know that success was due to the cooperation of the beekeepers, inspectors, and the Department of Agriculture. The Department of Agriculture and the Governor have stood by us, assisting in every way possible.

Respectfully submitted,

A. L. KILDOW,

Chief Inspector, Division of Apiary Inspection.

REPORTS OF DEPUTY INSPECTORS FOR 1930.

JoDaviess County.

(Deputy C. W. Duerrstein, Galena.)

For the year 1930 I visited 132 apiaries and inspected 1,923 colonies. I found 63 colonies infected with American foulbrood, 6 of these colonies were treated by owner and myself and 57 colonies were destroyed by burning by owner or myself. All the work was done in JoDaviess County. I did not get all over the county. I worked only in districts that were infected. There is always some American foulbrood showing up in the southern and western part of the county. I think the notices sent out by the State are fine for a notice headed by a State department has more weight. As the fall season was dry bees did not go into winter any too good, some of them having to be fed.

Winnebago, Ogle and Lee Counties.

(Deputy S. S. Claussen, Oregon.)

In my work for 1930 I found 2,904 colonies of bees of which 568 were diseased. Of these 505 were burned. The disease is getting under control far more than when I started doing the work. I did not do much last summer because of shortage of funds, but it has sure done a lot of good as there seems to be better and bigger honey crops in the inspected sections and people tell me they feel more like eating the honey when they know it comes from clean yards. There are some beekeepers that are after the education in beekeeping, more than the eradication of the disease.

Sale of honey is slow due to large crops two years in succession and the non-employment of the working man as he is the largest consumer of extracted honey. At least I find it that way in and around Rockford and Chicago.

Winnebago is still pretty foul in spots as I did not cover all territories that should have been inspected due to lack of funds. Winnebago is looking to better beekeepers and more of them. There are 19 new beekeepers that I know of. Bigger honey crops are due to inspection which is just what every beekeeper looks for with pride.

Bees have come through this season so far in fine condition with lots of good stores. Honey plants do not look so good for 1931 due to the drought. In my estimation the clover flow will not be big as clover did not grow very much last season.

DeKalb and Boone Counties.

(Deputy C. H. Tudor, Sycamore.)

My inspection report for 1930 is as follows: I inspected 115 yards with a total of 1,723 swarms of bees. I inspected 1,195 of these and found 130 to have American foulbrood. One hundred and twenty-one were burned and 9 were treated.

The year 1929 was sure to bring out American foulbrood if any was stored in the hive. Bees in this locality went into winter quarters a little light in stores and with no snow this winter and dry in the fall, I don't look for much clover this summer.

Honey is moving slow and at a low figure, working conditions being the cause I think.

McHenry County.

(Deputy Ray J. Bartholf, Richmond.)

For the year 1930 I visited 92 apiaries totaling 901 colonies of bees, of which I inspected 660 colonies. I found 247 colonies infected with American foulbrood, 74 of which were treated and combs burned. The remainder of the infected colonies were killed and burned by the owner and myself.

The most of the beekeepers were very agreeable and were glad that I had come to inspect their apiary. They would turn right in and help me with the work. There are a few of them very disagreeable, two of them ordering me out of their yard. I gave them Circular No. 261, State law on bee diseases. In three days I came back to their apiaries, and they were willing for me to inspect their bees.

The 1930 crop was not as good as the 1929 crop, but a very good quality.

My bees produced 150 pounds of extracted honey per colony.

Most of the colonies have plenty of stores for the winter.

Lake County.

(Deputy Edw. M. Klein, Gurnee.)

During the past season I inspected 83 apiaries containing 990 colonies of which 115 were in box hives. Of the total number 294 colonies were diseased with American foulbrood, of that number I personally burned 174, the balance being taken care of by the owners. It is very seldom that one finds a case of European foulbrood here. I spent a total of 18½ days on the above work. Considering the number of small yards, general heavy infection, the fact that every colony at all yards was inspected and the large amount of time spent explaining the situation to the beekeepers, as this was the first general inspection ever carried out here I believe good progress was made. I believe another year's report will show disease to have been reduced at least 20 per cent in Lake County.

Lake County.

(Deputy, C. P. Jankowski, Gurnee.)

During the year of 1930 I inspected approximately 1,950 colonies. Forty per cent of bees were infected with American foulbrood of which

I burned 425 colonies, and the remaining colonies were either treated or burned by owners. Present conditions in Lake County are far much better than a year ago.

DuPage County.

(Deputy Wm. J. Wallanches, Downers Grove.)

I have been fortunate this year to be able to cover the entire DuPage County. I inspected 1,251 colonies, finding 214 diseased colonies, of which 121 were burned, the rest being treated.

The northern part of my county was the most affected with American foulbrood due to the fact that some sections had never been inspected before.

I would suggest to beekeepers who have to buy honey to meet their demand, to be careful when buying to inquire whether the bees are free from American foulbrood, as most people are a little careless about allowing such honey exposed to their own bees, not realizing the risk.

During my inspection I heard of various ways of wintering bees, and thought I would submit my method of wintering bees. Remove the cover, and right over the frames or inner cover, place several burlap sacks or any other rags, letting the edges hang over the sides. Then wrap tar paper all around the hive, folding the edges on top so as to make a little thickness. With this accomplished replace the wood or outer cover. The entrance should be 7/8 of an inch wide, and about 1 inch long, as with a narrow entrance there is danger of getting clogged up with snow and ice causing bees to suffocate. I have packed my bees in this way on 20 colonies for two years, and found they winter through just as good as if they had been packed with 8 inches of straw on all sides.

Cook County.

(Deputy J. R. Wooldridge, Chicago.)

During the 1930 season in Cook County, we met with many delays in the early part of the season on account of the weather and the one causing the most serious delay was the northeast wind which puts the temperature below 60 degrees and makes it unfavorable to handle bees. Deputies are instructed to cease inspection work until the weather is 60 degrees or more, and often this will last three or four days at a time.

We had less deputies working last season than ever before, but with a new and well organized system now in vogue we were able to accomplish more work per deputy than ever before, hence a reduction in cost per colony. We have met with more cooperation than ever before, but still we have some who resent our presence, but at last we show them their error and no further delay is encountered. All apiaries listed in county are carefully inspected. If infection is found, when possible we burn at that time, if not a short notice is given and on our return we burn what infected colonies are found regardless whether the keeper is present or not. This does away with all arguments, delays, and closes all chances of litigation.

Cook County apiaries had a close inspection and the greatest number of diseased colonies burnt the past season on record. This may seem harsh but it is the only sure way of destroying American foulbrood.

I do not anticipate a great amount of American foulbrood this spring on account of so much wholesale burning last fall. This does away with the opportunity of being robbed out and lessens the spread.

It seems the general outlook for the beekeepers of Cook County is much improved, but there is much work still to be done before the county will be free of American foulbrood. On account of our markets and truck facilities we can look for new points of infection each year.

Henry County.

(Deputy Elmer Kommer, Woodhull.)

My report from Henry County will show very little work this year, as I worked only 17 days examining 695 colonies.

I found my greatest infection around Galva, and then one yard at Toulon, but the Toulon yard was all shaken by the owner and cleaned up. At Galva I helped burn 18 colonies which were either in box hives or too weak to treat, the rest being shaken either by me or by persons capable of doing so.

My inspection at Kewanee was very encouraging, as I made a good examination and I failed to find a single case of American foulbrood anywhere in or around there.

No work was done in the northern part of this county in 1930 so cannot report whether there is any disease left or not.

My opinion is that the law should be more strict on moving bees around in the counties as in spite of all the inspector can do, there is always someone that moves bees, and in some cases this is how new outbreaks of foulbrood occur.

The European foulbrood is getting less every year, owing to the fact that beekeepers use better strain of bees in their apiaries, and wherever I found any of this disease, the beekeepers ordered Italians to replace the poor ones heading such colonies.

	Henry County.	Stark County.	Mercer County.	Total.
Colonies inspected	660	24	11	695
Colonies with European foulbrood	21	0	4	25
Colonies with American foulbrood	37	18	0	55
Colonies treated	19	18	11	48
Colonies burned	18	0	0	18
Number box hives	53	0	0	53

Kendall County.

(Deputy John O'Brien, Newark.)

In 1930, I inspected 722 colonies, 32 of which were diseased and 65 dead, of which 45 were burned.

Grundy County.

(Deputy C. J. Anderson, Morris.)

In 1930 I visited 12 apiaries totaling 130 colonies of bees of which 20 were diseased. I burned 19 of them, one being treated by owner.

We had a good stand of white clover along with the sweet clover. The weather was hot with a few sprinkles of rain. My bees averaged 112 pounds of honey. There were plenty of fall flowers but it was so dry that bees only got their feed from them.

Will County.

(Deputy Valentine W. Heussner, Lemont.)

My report of inspection for 1930 will be very brief owing to other pressing and important work during the months of May and June. I could not give any service to my county during those months, and about the time when I expected to commence work where I had left off the previous year, notice was received from the Chief, A. L. Kildow, to close the year's work and wait for further orders. This left my district without inspection and in very bad shape and I fear that a few localities are going to be in a discriminating condition.

Will County had a fair crop of very good quality honey, but as a part of the previous year's crop was held over and the present demand poor on account of the depression, the real honey consumer cannot buy your product. for it is bread they need first of all. This together with the new corn sugar law, the future outlook of the honey producer is not so bright as a year ago.

The continuous dry weather last fall left the clover plants in a very poor condition, and I am not looking forward for much of a crop in 1931. Bees went into winter quarters with a great amount of old bees which is another setback for 1931.

Adams County.

(Deputy E. W. Rittler, Quincy.)

My inspection work for 1930 was spare time work and what calls I had from different apiaries. I found no disease. The general condition for 1930 from all reports are free from disease. In the city I found one American foulbrood which was burned. This was a box hive.

Henderson County.

(Deputy J. W. Long, Stronghurst.)

Practically all colonies that showed diseases have either been treated or destroyed. I find the people in general are more agreeable to deal with than a year or so ago, with a few exceptions.

We had a good honey flow in my locality this season, 1930, and the bees went into the winter in good shape.

Fulton County.

(Deputy F. R. Belt, Canton.)

During the year of 1930 I inspected 31 apiaries with 385 colonies. I found 89 colonies infected with American foulbrood of which 31 were

burned by the inspector, the rest being left for owner to burn or treat. The average number would be about 12 colonies in each apiary.

In general they are making a pretty fair cleanup with few exceptions. Where they are using good methods of cleaning up they are more successful than those with careless methods.

The neighborhood of Lewistown is practically 100 per cent foulbrood. Cuba has made an extra good cleanup. From Smithfield on north to Spoon River is fair. Farmington seems to have some disease yet. Canton and its rural routes are practically clean.

The western part of the county just had a fair honey flow. The eastern half had practically none to speak of.

Bees went into winter in fair condition. Where they used large hives they had enough stores to last through the winter. Where they used the smaller hives they had to feed back. Winter loss will evidently be heavy where they are not well protected.

Peoria County.

(Deputy B. F. Bell, Kingston Mines.)

I have visited 53 apiaries this year, inspecting 594 colonies in which I found 55 colonies infected with American foulbrood. The most of the infection was in three apiaries that had been neglected and old box hives used. All infection was destroyed by fire. Treating is dangerous in the hands of inexperienced beekeepers.

As I was called in on account of the inspection funds being low, I did not get to visit all the apiaries in the county, but went where I thought the inspection was needed the most. I went many places on my own account in order to stop the spread of American foulbrood. I find no more trouble in getting the cooperation of the beekeepers, as they have learned that American foulbrood means disaster to their apiary unless it is taken care of at once.

This year was dry and hot and only about one-third of a crop was produced, but the quality was very good.

Mason and Logan Counties.

(Deputy S. A. Tyler, San Jose.)

In 1930, I inspected 1,926 colonies in 99 apiaries, finding 89 American foulbrood colonies in 17 apiaries, these being treated.

McLean County.

(Deputy Edw. C. Heldt, Stanford.)

My inspection report for 1930 is as follows:

Number of apiaries visited	35
Number of colonies	570
Number of colonies inspected	566
Number of colonies diseased	54
Per cent diseased	9.4%
Total burnt by inspector	35
European foulbrood treated colonies	5
Number of box hives	7
Per cent of box hives	1 % plus

Disease around the cities is prominent in the vicinity of the city dumps. It is the owners' opinion that that is where their bees got it. A general survey of the territory bears this out.

This is the second short crop in succession. Nevertheless the poor years now are better and will be increasingly more so than the poor years of the past. The farmers are turning to the use of more clover, limestone, and stock. Those bees within the flight of sweet clover did fairly well. Red and alsike clover yielded well. Some late swarms and weak colonies had to be fed for winter. Those colonies within the range of clover did not do much brood rearing as the bees did not want to put honey in the super.

Livingston, Ford and Kankakee Counties.
(Deputy J. T. Henricks, Chatsworth.)

County.	Number of colonies.	Number diseased.	Number treated.	Number burned.	Number in trees and buildings.
Livingston	3,855	51	13	38	3
Ford	296	35	11	24	5
Kankakee	537	74	----------	74	----------
Total	4,688	160	24	136	8

The above is my total report of 1930 inspection work. The way I carry out my inspection work is that I try my very best to get in touch with all the bees that are in trees and buildings. I have found a number of these kinds of swarms that had disease which were in some of my localities where we were trying to clean up foulbrood and always could not make a perfect cleanup. It appears in this way we can get somewhere with the eradication of foulbrood.

Iroquois, Ford and Vermilion Counties.
(Deputy J. N. Koritz, Buckley.)

During the year 1930, I inspected 1,134 colonies in 118 yards and found 282 infected with American foulbrood. Nearly all the disease found was in new territory which had never been worked by an inspector before.

After I started inspection in the new territory every beekeeper knew I was coming. The news was a few days ahead of me. They thought that was awful and they expected something awful to happen. The most of them, after they saw what we inspectors were doing, were well pleased and cooperated with me in helping clean up the territory.

The general conditions in this locality are greatly improved since we organized the County Beekeepers' Association. Some of the larger beekeepers say that in this locality it has improved 75 per cent or better in the last three years in regard to disease and better beekeeping. There is plenty of inspection still to be done in my locality.

Champaign and Vermilion Counties.
(Deputy W. H. Force, Champaign.)

During the year of 1930, I inspected 3,940 colonies. Out of this number there were 137 live colonies found to have American foulbrood and 17 dead colonies with American foulbrood, making a total of 154

American foulbrood colonies. Of this number 99 American foulbrood colonies were burned and 55 colonies treated. One colony was found to have European foulbrood.

The biggest percent of this disease was found in Vermilion County and mostly in new areas which had not been covered by inspection.

Edgar, Douglas, Clark and Crawford Counties.
(Deputy Maxel Mapes, Paris.)

The season of 1930 has been a stunner. There was practically no fruit bloom in the spring, owing to the severe freezes of the preceding winter. This was followed by extremely dry and hot weather throughout the spring and summer.

Dandelion can usually be depended on for a good stimulative flow during the early spring, but owing to the unusually dry weather, it was almost a failure.

White clover and alsike both failed to yield. Our only honey flow of any consequence started about the last week in June from white blossoms sweet clover. On yellow clay soil, it was almost a failure. In fact, I found bees starving within five miles of other bees that were storing surplus.

These conditions, of course, slowed up inspection and will probably cause the spread of American foulbrood. In fact, I found several cases of American foulbrood during the latter part of September in a vicinity where it had never been found before. One professional who had kept an outyard in that neighborhood for fifteen years without a single case of American foulbrood reported 16 cases late this fall.

All colonies infected with American foulbrood were either treated and the old combs and hives burned or gassed and the entire hive and contents burned.

I did not start to inspect until the flow started from sweet clover July 1st, as I do not consider it wise to break into box hives or hives with crooked combs when there is danger of robbing.

I did all of the work I could during this flow and continued later during a light smart weed flow. During the season I worked 20¾ days, drove 656 miles, visited 54 apiaries containing 835 colonies, 139 in box hives; examined 327 colonies, finding 50 infected with American foulbrood and one with European foulbrood; treated 27 colonies for American foulbrood and burned 16 old hives and contents, burned 12 colonies completely, after gassing; and sealed 2 colonies, one in a house and one in a tree with asphalt.

My work was distributed by request over 4 counties. In Edgar County, I inspected 456 colonies, the percentage of American foulbrood infection found and reported was approximately 6.8 per cent.

In Douglas County, 70 colonies with approximately 35.7 per cent infection.

In Crawford County, 179 colonies with approximately 5.5 per cent reported.

In Clark County, 46 colonies with no disease found.

All beekeepers received me cordially and willingly cooperated with me and never failed to ask me to return. If given the opportunity and

my health permits, I expect to give this territory a thorough going over next season, as I fear, that with another season like the past, American foulbrood would take a heavy toll. Let's hope for the best.

Jersey County.

(Deputy C. A. Mackelden, Jerseyville.)

During my inspection work for 1930 I inspected nearly all the colonies of bees in Jersey and Calhoun counties and about 30 per cent of the colonies in Greene County.

There are three classes of beekeepers in this district; one class keep bees for pollenization of their orchards; another class, for commercial purposes and the third class just have them.

The beekeepers that keep them for pollenization of their orchards have mostly modern equipment, particularly is this true of the orchard people of Calhoun County. All the beekeepers of Calhoun County are assisting in the eradication of disease and I believe with inspection next year they will have the disease under control in that county.

In Jersey County nearly all the beekeepers have bees for their honey and of course are deeply interested in wiping out American foulbrood.

The beekeepers that I have visited in Greene County had not taken much interest in their bees, but had them for what little honey they might get for their own consumption.

All the beekeepers in this district are now functioning, and working in harmony to eradicate American foulbrood and to get all equipment standardized.

As there were many fall flowers that had a long siege in blooming before frost the bees went into winter quarters with plenty of pollen and honey and unless we have a very severe winter they will be okeh for 1931.

Montgomery, Macoupin, Calhoun and Christian Counties.

(Deputy O. W. Kennett, Ohlman.)

In the year of 1930, I inspected bees in the following counties: Montgomery, Macoupin, Calhoun, and part of Christian.

I inspected 5,035 colonies. I found 161 colonies affected with American foulbrood and five colonies with European foulbrood. There were 487 colonies in box hives. Only a few colonies that were affected with American foulbrood were treated. The largest number of the diseased colonies were burned.

The bees in this locality went into winter quarters in fairly good condition although their stores are not of as good quality as usual, as asters were more abundant for their nectar supply than any of the other fall flowers.

Only the bees that were located near sweet clover fields made a surplus of honey this year, which in all, only amounted to about one-fourth of a crop. Prospects for a crop of honey in 1931 are poor as the drought last summer killed most all of the white clover.

Christian and Shelby Counties.
(Deputy Frank Bishop, Taylorville.)

I visited 64 apiaries in Christian and Shelby counties. The number of colonies inspected was 1,061 of which 61 had American foulbrood. These we destroyed, while 3 European colonies were treated.

There being very little secretion of nectar at those dates made this work very tedious. In my section we scarcely held our own but the season was against us. Many colonies in our section I fear went into winter with poor stores and also a shortage; but my colonies were well fed.

Perry and Randolph Counties.
(Deputy Roy I. Annear, Mulkeytown.)

From July 1, 1929 to July 1, 1930, I inspected in Perry and Randolph counties about 2,885 colonies of bees. About 8 per cent had American foulbrood. In Sparta, every colony had foulbrood. There were 100 colonies scattered around in 25 different yards. There are bees in trees all over that part of the country, so you see it is very hard to clean up, as disease is where it can't be reached.

The farmers are growing more sweet clover each year and beekeeping is growing too. Randolph County has a 4-H Bee Club membership of about 20 and they are helping to keep down disease by cooperating with the Farm Bureau and me. Let us all work together and we can keep down American foulbrood.

The honey flow was short this year on account of the dry weather, but most of the bees, I think, have plenty of stores for the winter.

Saline, Gallatin and White Counties.
(Deputy Louie Vannis, Harrisburg.)

For the season of 1930, I inspected in White County 49 colonies. Of that amount one colony was found to be affected with American foulbrood which was destroyed by fire.

In Gallatin County I inspected 934 colonies. Of these, 445 were modern hives and 489 were boxes. Out of 934 colonies, 28 were found to have American foulbrood of which 20 were burned and 8 were treated.

In Saline County I inspected 2,035 colonies of bees, 1,377 being in modern hives and 658 in boxes. Of the 1,377 colonies, 91 were found to have American foulbrood, 65 being destroyed by fire and 26 treated.

For the three counties, I inspected 2,969 colonies of bees. I inspected 1,811 modern hives and 1,158 box hives, making a total of 2,969 colonies. Of that amount, 120 were found to be diseased, 74 of which were burned and 46 treated.

Nineteen hundred and thirty has the record for being the driest year in this section in 40 years, but bees managed to make a little surplus this fall and put up enough for the winter to go through in good shape.

Williamson, Jackson and Union Counties.
(Deputy Otis Kelly, Marion.)

I began my inspection about March 15 as we had an early spring. The bees came through the winter and were in good shape at this time of the year. They had plenty of stores but we were hit with the worst dearth in many years and the bees were hit hard.

I inspected Williamson, Jackson and Union counties and found foulbrood in all of them. It got a good hold principally in Jackson County due to so much robbing during the drouth. We got the bees well cleaned up and I had good cooperation with all the beekeepers.

We had some rain in August and September and we had a good honey flow just before frost. The bees made some surplus and plenty of stores, averaging about 50 pounds to the colony. I worked part of March, all of April, May, and June and after I was laid off, when I was called on by the beekeepers. I inspected about 5,000 colonies in the year's work.

The beekeepers are beginning to see that they must keep bee modern or go out of business, which will be a great help to inspectors in years to come when there are no more box hives.

ANNUAL REPORT OF THE CHIEF INSPECTOR OF APIARIES FOR THE YEAR ENDING JUNE 30, 1931.

(A. L. KILDOW, Putnam, Illinois.)

PUTNAM, ILL., *June 30, 1931.*

To the Honorable, Louis L. Emmerson, Governor of the State of Illinois.

SIR: I have the honor of hereby submitting my annual report, as State Inspector of Apiaries, showing work done during the year ending June 30th, 1931.

This year our apiary inspection work was done on the county organization plan, which plan we have followed for several years and found it to be the most satisfactory method. By this plan the beekeepers of the county are united and work together and plan for the good of the industry. They also have their own inspector and by cooperating with him they secure results in the eradication of disease.

The county inspectors answered calls for assistance, and visited the infected apiaries rather than those they knew to be free of disease. Thus many of our large commercial beekeepers were not visited and time was spent with those unable to cope with disease, as we hoped in this way to come nearer a clean up. This caused our report to deal mostly with diseased apiaries and made the percent of disease show higher than it really is as it was computed on our actual work in diseased localities. We must remember that very many clean apiaries, kept by experienced bee men are not considered in this percent, which if considered would greatly reduce the percent of disease.

To show that the interest is growing among our beekeepers, we find them banding together and organizing associations in various parts of the State. Among the most recently organized we have Morgan-Scott, Bureau-LaSalle, Shelby, Ford, Macon, and Stark County. The McHenry-Lake County Association is in on the boom, all working together for the advancement of beekeeping and trying to solve the problem of honey marketing. This association is standing by and cooperating with their inspectors and adding very many new members to our State Association.

The Cook-DuPage County association is pushing forward and expects to show some of the fruits of their labor at the State Fair. Most of the associations are energetic in their work for they realize that cooperation means success.

The following counties have been organized: Bureau-LaSalle, Champaign, Cook-DuPage, DeKalb, Ford, Franklin, Fulton, Grundy, Hancock, Henry, Iroquois, JoDaviess, Jefferson, Jersey, Kendall, Logan,

McHenry-Lake, Morgan-Scott, Montgomery, Mercer, Rock Island, Macon, McLean, Ogle-Lee, Peoria, Piatt, Stark, Shelby, Stephenson, Saline-Gallatin, Warren, Whiteside, Will, and Woodford. These various counties have held field meets and demonstration meetings to assist those unacquainted with disease and to show the up-to-date method of beekeeping.

Our inspectors are frequently called upon to talk and explain the benefit of bees before the Farm Bureau meetings. The farmers and orchardists realize the need of bees for pollinating purposes. One inspector examined thirty apiaries where the bees were kept for pollinating orchards.

In August, 1930, the beekeepers and horticulturists had a combined tour. The fruit growers assembled at Pittsfield August 6 and thence to the Anderson orchard where they were joined by the beekeepers. At the evening meeting Stuart E. Pierson, Director of Agriculture, was present and gave an interesting talk showing the interest of the Department of Agriculture in these two industries. Points of mutual interest to the fruit grower and beekeeper were discussed by G. H. Cale, associate editor of American Bee Journal. It has been said that if the bees did not produce a pound of honey they would be worth their keep for pollinating purposes.

The inspectors not only inspect the apiaries to locate disease but they are educators and impart knowledge as to how the disease looks in the various stages and explain the result of letting diseased colonies remain in the apiary. They also show the better and modern way of keeping bees for profit and the benefit of the frame hive over the old gum even if the bees are kept for pollinating purposes instead of honey production.

During the year ending June 30, 1931, we visited 4,928 apiaries with 58,627 colonies, finding 1,185 apiaries to have disease and in these diseased apiaries there were 5,006 diseased colonies of which 2,908 colonies were destroyed and 830 colonies were treated by shaking and burning all diseased combs and honey, the remaining diseased colonies being left for future treatment.

A. L. KILDOW,
Chief Inspector, Division of Apiary Inspection.

REPORTS OF DEPUTY INSPECTORS FOR 1931.

Jo Daviess County.

(Deputy C. W. Duerrstein, Galena.)

For the year of 1931, I visited 74 apiaries and inspected 2,223 colonies. I found 45 colonies infected with American foulbrood. These colonies were destroyed by burning which was done by owner or myself. I found a few colonies with European foulbrood which were requeened.

As the season was so dry there was a very small amount of surplus honey, in fact there were some colonies starved at the peak of brood-rearing. As the fall flow of honey was fairly good and quite long, bees should winter all right.

Stephenson County.

At the county association meeting October 3, 1931, Deputy Inspector Schaeffer reported examining 1,867 colonies on a partial survey of the county, finding 19 with American foulbrood.

McHenry County.

(Deputy R. J. Barthoff, Richmond.)

For the year 1931 I started work on April 1 and I visited 216 apiaries, consisting of 3,120 colonies. I examined 2,561 colonies, and found 645 colonies infected with American foulbrood, of which 28 were treated, the rest of them being destroyed by burning, which was done by the owner and myself. I find some yards infected very badly with American foulbrood and I find some with no disease. It seems to be in spots.

The honey crop was very poor in McHenry County this year; there was no white clover. The most of the colonies are fairly well supplied with stores as the late fall flow was very good.

Lake County.

(Deputy C. P. Jankowski, Gurnee.)

During the year of 1931 I visited 143 apiaries totaling 973 colonies of which 67 were diseased. I burned 23; the remaining were either treated or burned by the owners. Among the above hives there were 43 box hives. Most of them were transferred this year.

Ogle-Lee County.

(Deputy S. S. Claussen, Oregon.)

In 1931 I visited 204 apiaries totaling 5,162 colonies of bees of which 792 were diseased, 775 American foulbrood and 17 European foulbrood. A total of 759 were burned, the balance were treated. There

is still disease around as I had some calls for inspection after the season closed but I told them they would have to wait until the Spring of 1932. I have done a lot of burning in Rockford. It is hard to find them all in a city of 100,000. By the time one gets them all looked over and cleaned up some other careless fellow will have some disease started again. If they would all be particular we would soon have the disease stamped out but it is people's own carelessness that keeps it going. I found some apiaries in Rockford this last fall that were all foul. I burned them out completely. Some get nearly "red headed" about it but I tell them that they must live up to the State laws or get into trouble. I have had more and more calls for inspection work this last summer than ever before but a lot of people don't even know about a bee inspector.

The honey flow was very short in this locality but of very good quality. Bees have good stores to winter on around here.

Group of Deputy Inspectors at meeting at home of Chief Inspector of Apiaries, A. L. Kildow, Putnam, September 10, 1931. Standing, left to right: Edw. Klein, Gurnee, Lake Co.; H. W. Hoffman, Peru, LaSalle Co.; C. P. Jankowski, Gurnee, Lake Co.; J. N. Koritz, Buckley, Iroquois Co.; Elmer Kommer, Woodhull, Henry Co.; S. S. Claussen, Oregon, Ogle Co.; Benj. H. Fischer, Roanoke, Woodford Co.; A. L. Kildow, Putnam. Kneeling, left to right: F. R. Belt, Canton, Fulton Co.; B. F. Bell, Kingston Mines, Peoria Co.; S. A. Tyler, San Jose, Logan, Co.; and Ross Morrill, Batavia, Kane Co.

DeKalb and Boone Counties.

(Deputy Carl H. Tudor, Sycamore.)

A little work in March and April does wonders. An inspector can not cover much ground at that time of the year but he can sure find the dead ones and get them out of the way before robbers get them. This year I visited yards containing 2,879 swarms, inspected 1,986 hives, found 187 with American foulbrood and burned 162. I treated 25 and to date they are O. K. There are localities in my counties where we have wiped out American foulbrood but farm sales in the spring are sure

a fine thing to spread it again. A law of some kind is sure needed to stop this kind of business; also some way for an inspector to know where bees are located. The inspector can find the beekeeper but it is a hard job to find the "keeper of bees" and as a rule he is the one that needs to be found.

Kane County.

(Deputy Ross R. Morrill, Batavia.)

In 1931 I inspected 18½ days and visited 88 apiaries. I inspected 1,071 colonies of which 148 had American foulbrood, 25 being treated and 123 burned.

I found most of the diseased apiaries in the north end of the county. The owners are foreigners and do not care to clean up.

DuPage County.

(Deputy Wm. Wallanchas, Downers Grove.)

For the year 1931, the whole county has been taken care of, the northern half being the most affected.

I visited 228 apiaries comprising 1,256 colonies, of which 120 were diseased, and practically all were destroyed by fire.

Of the total of 1,256 colonies, I found 97 box hives.

Practically all the beekeepers are willing to have their bees inspected, with the exception of a few who are ignorant of the disease, but when enlightened on the subject they are willing to have me inspect their apiaries.

Of the 97 box hives mentioned above, strange as it may seem, I have failed to find any disease in them, although I made the most thorough inspection possible, removing the bottom board and turning it upside down, and spreading the combs apart thereby enabling me to see the greater part of the hive.

The fact that these people do not disturb the hives often, not exposing the honey is one reason I believe for these box hives being free from disease. I believe if most beekeepers can keep their bees from robbing, that will go a long way in keeping their bees from disease.

I have found more people taking more interest in beekeeping during this depression than ever before.

Cook County.

(Deputy J. R. Wooldridge, Chicago.)

In looking back over the Apiary Inspection work of Cook County for the past season of 1931, we find that a tremendous amount of work was accomplished within a limited time with a minimum cost. The season was unusually late and scarcely anything could be done until after the first of June; many yards even at this late date were found still in winter packing and a second trip had to be made causing delay and expense.

A. F. B. seemed to have an unusual spread during the season, caused (in my opinion) by all stores being so completely exhausted within the

hive and any infected honey in remote places of hive were used up feeding the larvae causing a second or late Summer spread. It will be remembered that all diseased colonies found during the season of 1930 were treated successfully or burned. This caused an enormous lot of destruction of bees and frames by burning, as many infected colonies were found after the first of August which the lateness of the season would make it useless to treat hence they were burned.

The season as a whole in Cook County was the poorest in many years, several beekeepers that I know fell short from 1 to 8 tons from their average crop. Yet with all this loss and our menacing disease (A. F. B.) creeping up around us the beekeepers are a cheerful group, looking forward to the time when they again can actively engage in correcting errors they have made in the past.

The beekeepers of Cook County are giving us much more cooperation each year and many admit that if it were not for the inspectors they would be compelled to go out of the beekeeping business.

With plenty of early fall rains and an open winter so far all honey plants seem to be in good condition. Bees seem to have gone into winter quarters with plenty of bees and stores. With these conditions existing beekeepers feel that they have a good chance for a normal crop next season.

Rock Island and Mercer Counties.
(Deputy Dow Ripley, Aledo.)

During 1931 I visited 95 apiaries with 1,088 colones, found 47 cases of American foulbrood which were burned either by owner or myself. Thirty-two of these diseased colonies were in a territory that has been free from disease and in one-quarter mile of each other. I found very little European foulbrood, most cases being requeened last year.

Henry, Stark and Warren Counties.
(Deputy Elmer Kommer, Woodhull.)

In 1931 I inspected 986 colonies of which 128 were diseased with American foulbrood; the big percentage of disease was caused by no inspection done before, or not having had any inspection for a long time, and the big percentage was in Warren County where I found 56 American foulbrood out of 204 colonies, of which 22 were shaken, and 9 burned, and there is still some more to check up on which I left instructions with the beekeepers how to proceed in order to clean up their yard.

In Stark County I inspected 96 colonies of which I found 17 to have American foulbrood. Out of this amount, I found one yard that had 15 American foulbrood and were all cleaned up and shaken by the owner, the other two American foulbrood were also cleaned up so that Stark County was cleaned up of all the disease that I found on my inspection there.

In Henry County I inspected 686 colonies of which I found 55 to have American foulbrood and out of these 30 were shaken and 13 burned. The balance of the diseased colonies have not been checked up on to see

whether the owners followed out my instructions or not. This failure to check up on the rest of the diseased yards was not intentional, but owing to illness which prevented me from working, and I hope to check up on all colonies the first thing next spring.

The territory in and around Kewanee is in excellent shape when it comes to being free of disease, as I only found 5 colonies that had American foulbrood and 4 of them were either shaken or burned.

This territory was infected very badly with disease a few years ago, but the cooperation of the beekeepers has helped to make this practically a disease free territory.

The southern part of the county has now very little if any disease in it, but I would urge a more strict law on moving bees around without a permit, as it is impossible for an inspector to know of all the bees moved around or know where they come from, until they are located on the inspection trips, and then the chances are that they are missed until later when American foulbrood breaks out and it is very costly for the State.

Kendall County.
(Deputy John O'Brien, Newark.)

In 1931 I inspected 987 colonies of which 22 were diseased and 38 were dead. Of these 17 were treated and 3 burned.

Grundy County.
(Deputy C. J. Anderson, Morris.)

In 1931 I visited 215 apiaries totaling 292 colonies of bees of which 8 were diseased. I burned 3 and 5 were treated by the owners.

My bees average 110 pound per colony. Bees are going into winter quarters in good shape. The rains came in time for the fall flowers and the warm days gave the white clover a fine start for the coming year.

Will County.
(Deputy Valentine W. Heussner, Lemont.)

With the closing of the fiscal year 1931 great disappointment has been experienced by the beekeepers of this county by one of the greatest honey failures on record. This has also been noticeable in other farm commodities. But nevertheless beekeeping has advanced most satisfactorily in an educational manner. This is observable, due to the many inquiries made by mail and telephone. The inspector is now greeted in a more courteous manner, beekeepers are beginning to realize that he is not calling to destroy their property but to help them in a conservation way. This makes the work of the inspector more agreeable and pleasant than in previous years.

Inspection was carried on almost throughout the county, including some of the most isolated places, during the past season. Several apiaries were visited in each of the 36 townships comprising Will County. Some of the townships are now entirely free from American foulbrood, a few have a very slight reappearance and still a few others are in a rather

discriminated condition. A close check will have to be kept on those for they are parties that promise everything and do nothing after the inspector has left.

Much swarming was in progress during part of the season, which started a considerable number of new beginners into the beekeeping industry. Bees are going into winter quarters in a rather fair condition, although where extracting was done early, some feeding will be necessary.

The clover plants are in a fair to poor condition.

Mason and Logan Counties.
(Deputy C. A. Tyler, San Jose.)

In 1931 I inspected 1,975 colonies in 80 apiaries, in 7 of which were 29 diseased colonies which were treated.

Livingston, Ford, and Kankakee Counties.
(Deputy J. T. Henricks, Chatsworth.)

County.	Number colonies.	Number diseased.	Number burned.	Number of boxes, trees and buildings.
Livingston	2,327	68	68	15
Ford	159	32	32	1
Kankakee	602	11	11	----------
Total	3,088	111	111	16

The inspection work is progressing in this locality and we are getting American foulbrood under control, but I'll have to admit that the better way to try and eradicate this disease is that we inspectors must get in touch with the bee-trees and bees in buildings and other places. Some of these kinds of swarms and places have had disease for years. I have found places in trees and buildings where swarms have entered year after year but would die the following winter. Such reports did not sound very good and upon examination I would find foulbrood.

And again I have found where there would be plenty of room for swarms to build new comb each year. In this case swarms have lived three and four years and were still good but would have disease in previous combs, not so much, however, as a swarm that did not have room to build any new comb. In these cases I get rid of the swarms and thus I get permission from the owner to take the honey and comb and bees when they are healthy. When they are diseased I use brimstone at once and make a clean up. I think if we inspectors will all work this system that there is no reason why we can not get this disease totally under control.

Peoria, Fulton, Tazewell, and Schuyler Counties.
(Deputy B. F. Bell, Kingston Mines.)

The season of 1931 has been somewhat disappointing to some beekeepers as there was no white clover. The sweet clover was of short duration owing to dry weather. We had about one-fourth to one-half

a crop along with the depression. Honey is moving fairly well at a reduced price.

My inspection work was in Peoria, Fulton, Tazewell, and Schuyler counties. The work outside of Peoria County was done by special request. American foulbrood is becoming very scarce, except in spots where inspection has not been made. I have made it my business to teach the beekeepers how to detect foulbrood and in that way the appropriation money reaches much farther. We have about 2½ per cent foulbrood in Peoria County. I burn all diseased colonies that are not taken care of after due notice is given.

Macon, Dewitt and Shelby Counties.
(Deputy Otis L. Stone, Decatur.)

For the year of 1931 I visited 823 apiaries and inspected 5,233 colonies. The total American foulbrood found was 982, 805 being burned and 177 treated. The total of box hives was 908.

I find my work very interesting and pleasing. The Macon County and the Shelby County associations have been a great help to me in stamping out the disease. Our honey crop has been a little below normal, except in spots where there was a large crop.

Piatt and Moultrie Counties.
(Deputy Emory Warner, Monticello.)

I inspected 1,950 colonies, of which 160 had foulbrood, mostly American foulbrood. Sections of both counties are clean of disease and have been for two years, whereas a few years ago it was almost impossible to try to keep bees for honey production because of foulbrood.

The apiaries having disease were revisited once and some twice this season and seemed clean as I burned almost every hive that had American foulbrood unless it was a very strong colony and the honey flow was right.

Our main honey flow this year was sweet clover. If one was lucky enough to have bees near a field, the crop was good. In other places where bees were not near clover the crop was about 75 per cent of last year's crop as there was no flow from white clover here.

Champaign and Vermilion Counties.
(Deputy W. H. Force, Champaign.)

For the year of 1931 I inspected 3,668 colonies, 220 of which had American foulbrood and 5 European foulbrood, 3 sacbrood, 2 bee paralysis. There was one arrest made in the southeast part of Champaign County. There was also considerable trouble in Vermilion County, north of Danville, with beekeepers fighting among themselves over old man American foulbrood. After the inspector visited them the matter all cleared up and the disease was gotten rid of.

Morgan, Scott, Cass and Brown Counties.
(Deputy A. L. Holmes, Jacksonville.)

During maple bloom in April, I started inspection at Jacksonville, (Morgan County), and found the bees there badly infected with American foulbrood. Only two apiaries in the city were free from disease and most of the apiaries in a radius of two or three miles showed some disease. About 47 per cent of all colonies in this region, including Jacksonville, were infected. I also found some disease at Orleans and Waverly in Morgan County.

In Scott County some inspection was done near Riggston and Manchester, all apiaries examined being free from American foulbrood.

In Cass County my work was in and around Beardstown. American foulbrood was found in two apiaries in that region and European foulbrood has been giving a lot of trouble. There were many colonies showing infection this year and beekeepers report that they had more of it in 1930, this mostly in colonies where black bees predominate.

In Brown County around Versailles, I worked this region thoroughly from Hersman to the Illinois River and south to the county line, some apiaries there being badly infected with American foulbrood. All disease was cleaned up while I was there.

Montgomery, Macoupin, Fayette, Shelby and Christian Counties.
(Deputy O. W. Kennett, Ohlman.)

In the year of 1931, I inspected 4,890 colonies of which 1,090 were in box hives and 342 colonies affected with American foulbrood. Practically all of the diseased colonies were burned immediately after they were examined.

The bees in this section went into winter quarters in very good condition.

Prospects for a crop of white clover honey the coming season are not so good as very nearly all the clover died out last summer. There was very little rainfall here from early spring until late fall.

Perry and Randolph Counties.
(Deputy Roy I. Annear, Mulkeytown.)

Reviewing the inspection work done the past season (1930 and part of 1931) will say that that beekeeping in general has improved very much. Up to date yards are taking the place of box hives. Generally speaking, the beekeepers of these two counties have become educated to the fact that the inspector comes not to destroy their bees and equipment, but to help them financially and place them on the road to better beekeeping. The 1931 honey crop was short on account of dry weather, and the clover almost all died out.

About 2 per cent of the colonies inspected in these counties had American foulbrood, which was all cleaned, either being burned or transferred. But our worst trouble here is that we have so many bee trees that the inspector does not know about, or couldn't do anything about them if he did know. I have burned some colonies in trees with

gasoline. Very few farmers and beekeepers will tell you about a bee tree if they find one. My advice to inspectors is to get the cooperation of the best beekeepers and they will help you make better beekeepers out of the others.

Franklin and Jefferson Counties.
(Deputy R. C. Merideth, Whittington.)

In 1930 I did not do much inspection work and by 1931 foulbrood had spread badly. Most of it was found in and around towns. One apiary had 40 colonies, all with American foulbrood, and I traced it to some used hives he had bought for a song. He had another one to sing when he found what he had received for nothing.

Franklin and Jefferson counties are in very good shape now, although it will take much more work to keep the disease under control. I find hives that bees died in five or six years back that have started A. F. B. and I stopped the sale of some used hives in November. The bees had died in some of them. The owners told me that they would burn the frames and scorch the hives and then let me know. I aim to keep my eye on them.

Williamson, Jackson and Union Counties.
(Deputy Otis Kelley, Marion.)

The bees have gone through two trying years in these parts but they finished up this fall with plenty of stores and nearly all colonies produced some surplus, but not up to the average.

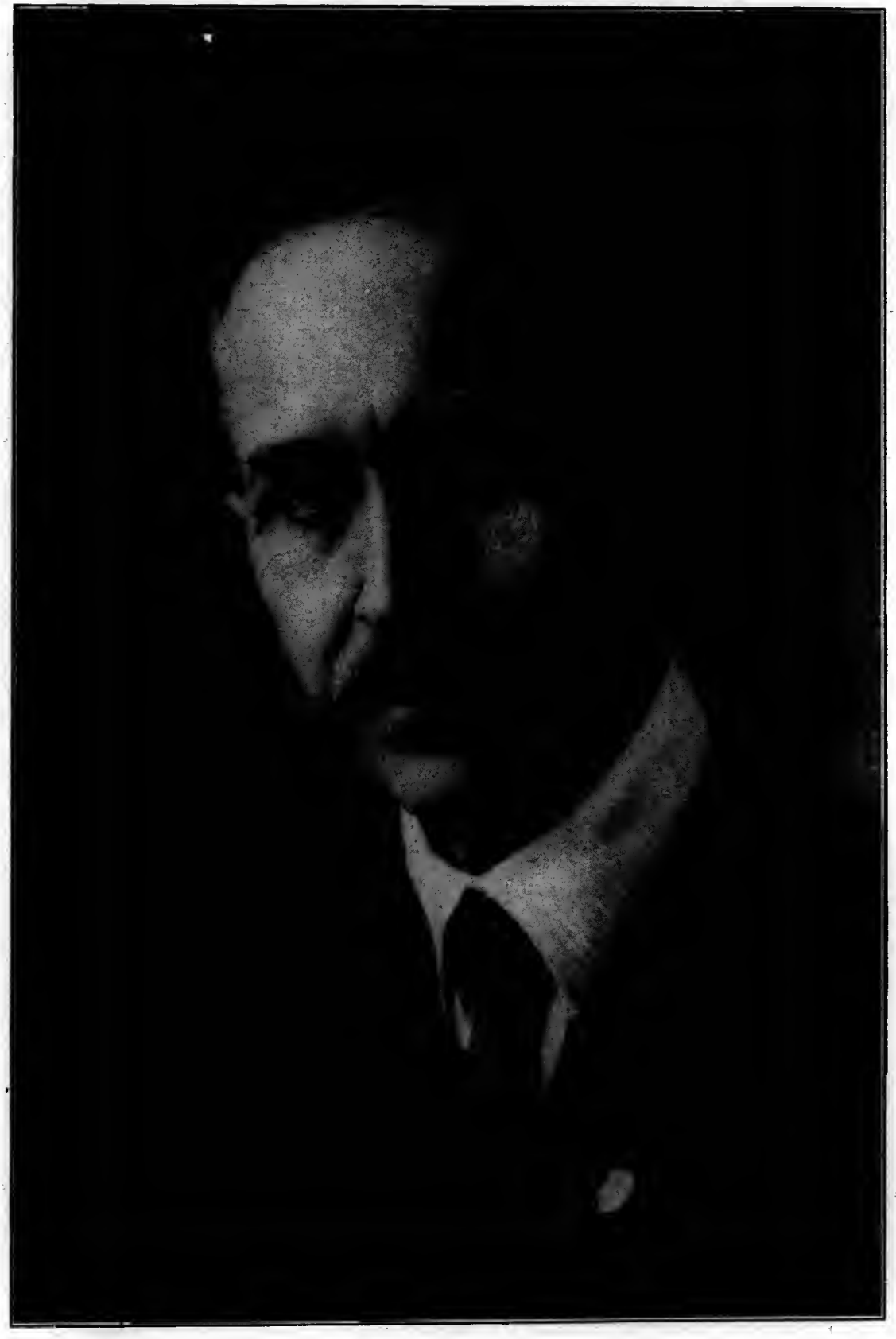
I worked 52 days in all, inspecting 3,286 colonies. I found 102 cases of disease and in every case the colonies were destroyed, as we think this is the only sure way to clean it up.

Saline and Gallatin Counties.
(Deputy Louie Vannis, Harrisburg.)

In Gallatine County I visited 70 apiaries and inspected 1,233 colonies of bees, 65 of which were diseased with American foulbrood. Of these 7 were treated and 58 were burned.

In Saline County I visited 218 apiaries and inspected 2,067 colonies of bees, 65 of which were diseased with American foulbrood. Of these, 13 were treated and 51 destroyed by burning, making a total of 288 apiaries visited and a total of 3,300 colonies inspected, 129 of which were diseased with American foulbrood. Of these, 20 were treated and 109 destroyed.

There was not so much requeening this year and a few more bees were put in box hives on account of hard times. In most sections bees did well where swarming was kept down.



Mr. A. L. Kildow, Putnam, Illinois, State Inspector of Apiaries.

STATE LAW ON BEE DISEASES

DESCRIPTION AND TREATMENT

Illinois Department of Agriculture

S. E. PIERSON, Director

SPRINGFIELD

APIARY DIVISION

A. L. KILDOW, Chief Inspector

PUTNAM, ILLINOIS

CIRCULAR NO. 261

NOVEMBER, 1927

The following material relating to bee diseases has been copied from Circular No. 261 (November, 1927), Illinois Department of Agriculture, at the suggestion and by permission of A. L. Kildow, Chief Inspector, Putnam, Illinois.

(Prepared by A. L. Kildow, Chief Inspector, Putnam, Ill.)

This bulletin is published especially to acquaint the public with the destructive bee diseases which are prevalent in the State and to show methods of controlling them. It is not the purpose of the State law to require the destruction of property, but on the contrary to conserve the property of beekeepers as much as possible and to place beekeeping on a paying basis. The owners of bees should do all in their power to eliminate bee diseases, and it is to the interest of every beekeeper, when disease is found among his bees, to observe and carry out treatment recommended. Some of the largest beekeepers in the State have had to fight bee diseases, and lessons thus learned have made them better beekeepers.

The treatments in this bulletin are stated as concisely as possible in order that no one will be confused. If there is any doubt as to whether or not disease exists, write to the State Bee Inspector for assistance.

STATE LAW ON BEE DISEASES.

AN ACT *to prevent the introduction and spread in Illinois of foulbrood among bees, providing for the appointment of a State Inspector of Apiaries and prescribing his powers and duties.*

WHEREAS, The disease known as foulbrood exists to a very considerable extent in various portions of this State, which, if left to itself, will soon exterminate the honey-bees; and

WHEREAS, The work done by an individual beekeeper or by a State Inspector is useless so long as the official is not given authority to inspect, and, if need be, to destroy the disease when found; and

WHEREAS, There is a great loss to the beekeeper and fruit growers of the State each year by the devastating ravages of foulbrood;

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That the Governor shall appoint a State Inspector of Apiaries, who shall hold his office for the term of two years, and until his successor is appointed and qualified, and who may appoint one or more assistants, as needed, to carry on the inspection under his supervision. The Inspector of Apiaries shall receive for each day actually and necessarily spent in the performance of his duties the sum of four dollars to be paid upon bills of particulars certified to as correct by the said State Inspector of Apiaries, and approved by the Governor.

SEC. 2. It shall be the duty of every person maintaining or keeping any colony or colonies of bees to keep same free from the disease known as foulbrood and from other contagious diseases among bees. All beehives, bee fixtures or appurtenances, where foulbrood or other contagious or infectious disease among bees exist, are hereby declared to be nuisances to be abated as hereinafter prescribed. If the Inspector of Apiaries shall have reason to believe that any apiary is infected by foulbrood or other contagious disease, he shall have power to inspect, or cause to be inspected from time to time, such apiary, and for the purpose of such inspection he, or his assistants, are authorized during reasonable business hours to enter into or upon any farm or premises, or other building or place used for the purpose of propagating or nurturing bees. If said Inspector of Apiaries, or his assistants, shall find by inspection that any person, firm or corporation is maintaining a nuisance as described in this section, he shall notify in writing the owner or occupant of the premises containing the nuisance so disclosed of the fact that such nuisance exists. He shall include in such a notice a statement of the conditions constituting such nuisance, and order that the same be abated within a specified time, and a direction, written or

printed, pointing out the methods which shall be taken to abate the same. Such notice and order may be served personally or by depositing the same in the postoffice properly stamped, addressed to the owner or occupant of the land or premises upon which such nuisance exists, and the direction for treatments may consist of a printed circular, bulletin or report of the Inspector of Apiaries or an extract from same.

If the person so notified shall refuse or fail to abate said nuisance in the manner and in the time prescribed in said notice, the Inspector of Apiaries may cause such nuisance to be abated, and he shall certify to the owner or person in charge of the premises the cost of the abatement and if not paid to him within sixty days thereafter the same may be recovered, together with the costs of action, before any court in the State having competent jurisdiction.

In case notice and order served as aforesaid shall direct that any bees, hives, bee-fixtures or appurtenances shall be destroyed and the owner of such bees, hives, bee-fixtures or appurtenances shall consider himself aggrieved by said order, he shall have the privilege of appealing within three days of the receipt of the notice to the County Court of the county in which such property is situated. The appeal shall be made in like manner as appeals are taken to the County Court from judgments of justices of the peace. Written notice of said appeal served by mail upon the Inspector of Apiaries shall operate to stay all proceedings until the decision of the County Court, which may, after investigating the matter, reverse, modify or affirm the order of the Inspector of Apiaries. Such decision shall then become the order of the Inspector of Apiaries, who shall serve the same as hereinbefore set forth and shall fix a time within which such decision must be carried out.

SEC. 2a. No person shall transport a colony of bees or used bee equipment, except a live queen and her attendant bees in a cage without comb or brood, from one county of this State to another county of this State, without a certificate from the Department of Agriculture, stating that it has, within sixty days before the date of shipment, inspected the colony or equipment and found it to be free from foulbrood.

SEC. 2b. No person shall transport a colony of bees or used bee equipment except a live queen and her attendant bees in a cage without comb or brood, into this State from a state or country having an inspector of apiaries or other officer charged with similar duties, without a certificate stating that the officer has, within sixty days before the date of shipment, inspected the colony or equipment and found it to be free from foulbrood.

No person shall transport a colony of bees or used bee equipment, except a live queen and her attendant bees in a cage without comb or brood, into this State from a state not having an inspector of apiaries or other officer charged with similar duties, unless the shipper or consignee has obtained from the Department of Agriculture, upon making a sufficient showing that the colony or equipment is free from foulbrood, a permit for the shipment into the State.

SEC. 3. The Inspector of Apiaries shall, on or before the second Monday in December of each calendar year, make a report to the Governor and also to the Illinois State Beekeepers' Association, stating the number of apiaries visited, the number of those diseased and treated,

the number of colonies of bees destroyed and the expense incurred in the performing of his duties.

SEC. 4. Any owner of a diseased apiary or appliances taken therefrom, who shall sell, barter or give away any such apiary, appliance, queens or bees from such apiary, expose other bees to the danger of contracting such disease or refuse to allow the Department of Agriculture to inspect such apiary or appliances, and any person who shall violate the provisions of section 2a or section 2b of this Act, shall be fined not more than $100.00.

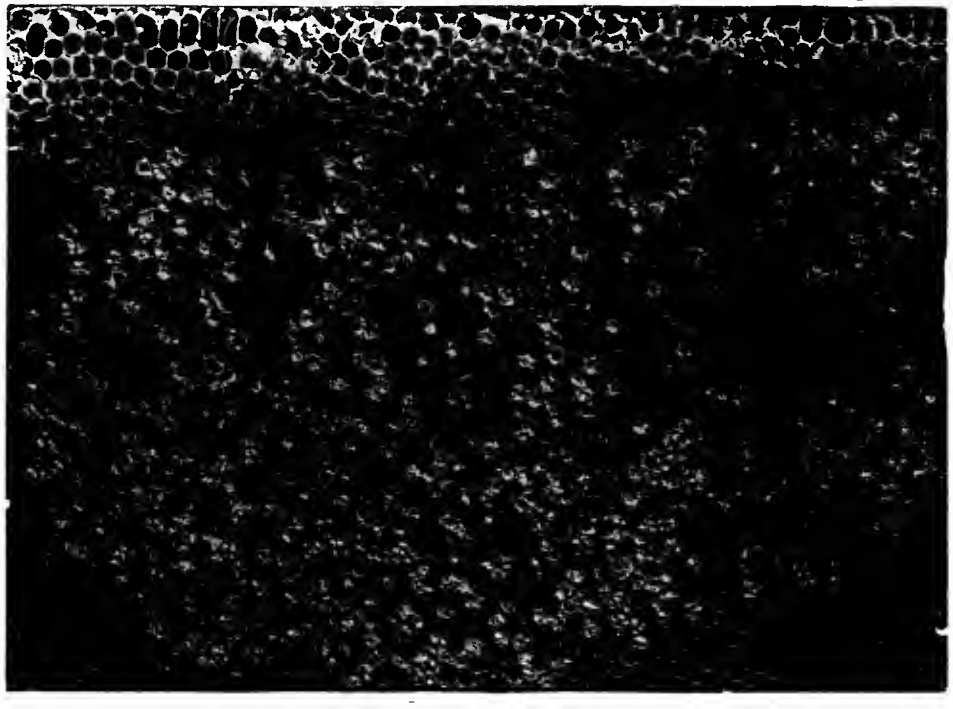
AMERICAN FOULBROOD.

Description.

(Bacillus larvae, White.)

The best description which can be given is that of Dr. E. F. Phillips, in Farmers' Bulletin 442, of the Department of Agriculture.

"American foulbrood usually shows itself in the larva, just about the time that it fills the cell and after it has ceased feeding and has begun pupation (changing from the grub condition to the winged insect.)



A comb of American Foulbrood.

At this time, it is sealed over in the comb (by the bees). The first indication of the infection is a slight brownish discoloration and the loss of the well-rounded appearance of the normal larva. At this stage the disease is not usually recognized by the beekeeper. The larva gradually sinks down in the cell and becomes darker in color and the posterior end lies against the bottom of the cell. By the time it has partially dried down and has become quite dark (*brown coffee colored*), the most typical characteristic of this disease manifests itself. If a match, stick or tooth pick is inserted into the decaying mass and withdrawn, the larva-remains adhere to it and are drawn out in a thread, which sometimes extends for an inch or more before breaking. This ropiness is the chief

characteristic in diagnosing the disease. The larva continues to dry down and gradually loses its ropiness until it finally becomes merely a scale on the lower side wall and base of the cell. This scale adheres tightly to the cell and can be removed with difficulty from the cell wall. The scales can be observed when the comb is held with the top inclined toward the observer, so that a bright light strikes the lower side wall. A very characteristic and penetrating odor is noticeable in the decaying larva. This can be best likened to the *odor of heated glue.*

"The majority of the larvae which die of this disease are attacked after being sealed in the cells. The cappings are often entirely removed by the bees, but when they are left they usually become sunken and frequently perforated. As the healthy brood emerges, the comb shows the scattered sunken cappings covering dead larvae, giving a characteristic appearance.

"Pupae (the transforming grub, also called chrysalis) also may die of this disease, in which case they, too, dry down, become ropy and have the odor and color. The tongue frequently adheres to the upper side wall and often remains there even after the pupa has dried down to a scale."

Treatment.

Previous to treatment clip the queen's wings when everything has been provided, go to the diseased colony, remove the hive from its stand and put it about three or four feet back. Place a clean empty hive on the old stand with a flat board or flat cover half way over the empty hive body with a brick on it to keep the cover from falling off.

Now smoke the diseased colony just enough to keep them quiet and proceed to take out the frames and shake or brush off the bees in the open half of the empty body, putting the combs in another hive body that you have placed handy to receive them, keeping them covered.

After you have all the bees in the newly prepared hive, close the hive with the board that is already over half of it. Leave the colony two days, then at the end of this time raise the board that is used as a cover about six inches and bring it down on the hive with a quick slam. This will dislodge the bees that have clustered on the under side of the cover or board. Have a hive in close reach with frames and full sheets of foundation, quickly put this prepared hive over the one that has the bees in, the bees will go up in this hive and in the morning lift the top hive off and place it on the bottom board, if any bees are on the sides of the hive body brush them in front of the colony and your treatment is complete.

Now take the diseased combs and burn them. If any comb has been built on the board or cover, this also must be burned. If the inspector finds a colony that is too badly diseased to warrant treatment he may order same burned.

EUROPEAN FOULBROOD.

Description.

European foulbrood usually attacks the larva at an earlier stage of its development than American foulbrood and while it is still curled at the base of the cell. A small percentage of larvae die after capping, but sometimes quite young larvae are attacked. Sunken and perforated cappings may exist as in American foulbrood. The earliest indication of the disease is a slight yellow or gray discoloration and uneasy movement of the larva in the cell. It loses its well-rounded opaque appearance and becomes slightly translucent so that the trachae may become prominent giving the larva a clear segmented appearance. Later the color changes to a decided yellow or gray and the translucency is lost. The yellow color is the chief characteristic of this disease. The dead larva appears as a moist, somewhat collapsed mass, giving the appearance of being melted. The larva finally dries in a grayish-brown scale against the base of the cell, or a shapeless mass on the lower side wall. Very few scales are black. The scales are not adhesive, but easily removed, and the bees carry out a great many of them. Decaying larvae which have died of this disease are usually not ropy as in American foulbrood, but a slight ropiness is sometimes observed. Sometimes a sour odor is present, which reminds one of yeast fermentation.

Treatment.

As soon as the disease shows, kill the old queen, and if the colony is common brown or black, keep all queen cells cut out. Fifteen days after you kill the queen, introduce a young laying Italian queen. If the colony be of good Italian stock, allow the colony to rear a queen. Keep the colony *strong;* a weak colony will not rid themselves of disease.

OLD BOX HIVES.

Remove a portion of the top so you can blow smoke in, turn the hive upside down, and place a box as nearly the size of the old hive as you can get, on top. Smoke into the opening that you have made and drum on the box, until you have all the bees out of the old hive into the box on top.

Place the box containing the bees where the old hive formerly stood. Saturate the old hive and combs with kerosene and destroy as instructed in American foulbrood.

In two or three days dump the bees from the box into a hive body which is placed on the stand where the box was and fill the hive body

with frames of foundation and place the cover on your hive. Destroy all combs that were built in the box.

If there is no disease in the old box hive, the bees may be run on full sheets of foundation at once.

SUGGESTIONS.

By adhering to the following suggestions and avoiding the "Don'ts" the beekeeper may save himself much trouble and worry as well as financial loss.

Don't use frame hives without foundation.

Don't use box hives, bees cannot be controlled in them.

Don't allow robbing in your apiary.

Don't waste your time trying to save a colony with only a handful of bees.

Don't buy everything you see advertised in bee papers, as they may not all fit your conditions.

Leave only a small entrance during spring, until your colonies show by clustering at entrance that a larger opening is necessary.

Keep all colonies strong, even should you have to resort to feeding in order to have the colony breed up. Feed granulated sugar syrup, a pound of sugar to a pound of water.

Use full sheets of foundation in your brood frames.

Keep a good strain of Italian bees.

Read the bee journals. The price of a good bee journal is money well spent.

If you winter your bees out of doors, give them adequate packing, using forest leaves or other absorbents for this purpose. Place at least six inches of leaves over the brood frames and at least four inches of leaves around the hives, except the front, held in place by wire netting.

Black bees and low-grade hybrids are the most susceptible to European foulbrood. Keep only pure Italian bees.

Make an effort to produce more honey this year than ever before.

(Reprint Circular No. 261, Illinois Department of Agriculture.)

FORMATION OF THE ILLINOIS STATE BEEKEEPERS' ASSOCIATION.

SPRINGFIELD, ILL., *February 26, 1891.*

The Capitol Beekeepers' Association was called to order by President P. J. England.

Previous notice having been given that an effort would be made to form a State Association, and there being present beekeepers from different parts of the State, by motion, a recess was taken in order to form such an association.

P. J. England was chosen temporary chairman and C. E. Yocum temporary secretary. On motion, the Chair appointed Thos. G. Newman, C. P. Dadant and Hon. J. M. Hambaugh a Committee on Constitution.

Col. Charles F. Mills addressed the meeting on the needs of a State association and stated that it was his opinion that the beekeepers should have a liberal appropriation for a State Apiarian Exhibit at the World's Columbia Exposition.

A motion to adjourn 'till 1:30 p. m. prevailed.

AFTERNOON SESSION.

The Committee on Constitution reported a form for same which, on motion, was read by the Secretary, by sections serially.

Geo. F. Robbins moved to substitute the word "shall" for "may" in the last clause of Section 1, Article III. This led to a very animated discussion, and the motion was lost.

J. A. Stone moved to amend the above-named section by striking out the word "ladies" and all that followed of the same section, which motion led to further discussion, and motion finally prevailed.

Section 2, Article II, relating to a quorum, was on motion, entirely stricken out.

Mr. Robbins moved to amend Article V by adding the words "Thirty days' notice having been given to each member." Prevailed.

Thos. G. Newman moved to adopt the Constitution, so amended, as a whole. Which motion prevailed.

(See Constitution).

J. A. Stone moved that the Chair appoint a Nominating Committee of three on permanent organization. Prevailed.

Chair appointed as such committee, Col. Charles F. Mills, Hon. J. M. Hambaugh and C. P. Dadant.

Committee retired and in a few minutes returned, submitting the following named persons as candidates for their respective offices:

For President—P. J. England, Fancy Prairie.

For Vice-Presidents—Mrs. L. Harrison, Peoria; C. P. Dadant, Hamilton; W. T. F. Petty, Pittsfield; Hon. J. M. Hambaugh, Spring; Dr. C. C. Miller, Marengo.

Secretary—Jas. A. Stone, Bradfordton.

Treasurer—A. N. Draper, Upper Alton.

Mr. Black moved the adoption of the report of the Committee on Nominations. The motion prevailed, and the officers as named by the committee were declared elected for the ensuing year.

Hon. J. M. Hambaugh moved that Mr. Thos. G. Newman, Editor, American Bee Journal, of Chicago, be made the first honorary member of the association. Prevailed.

At this point, Col. Chas. F. Mills said:

"Mr. Chairman, I want to be the first one to pay my dollar for membership," at the same time suiting his action to his words, and others followed his example, as follows:

CHARTER MEMBERS.

Col. Charles F. Mills, Springfield.
Hon. J. M. Hambaugh, Spring.
Hon. J. S. Lyman, Farmingdale.
C. P. Dadant, Hamilton.
Chas. Dadant, Hamilton.
A. N. Draper, Upper Alton.
S. N. Black, Clayton.
Aaron Coppin, Wenona.
Geo. F. Robbins, Mechanicsburg.
J. W. Yocum, Williamsville.
Thos. S. Wallace, Clayton.
A. J. England, Fancy Prairie.
P. J. England, Fancy Prairie.
C. E. Yocum, Sherman.
Jas. A. Stone, Bradfordton.

HONORARY MEMBERS.

1891—Thos. G. Newman, Editor American Bee Journal, Chicago.
1892—Frank Benton, Agricultural Dept., Washington, D. C.
Rev. W. F. Clarke, Guelph, Ontario.
1893—Rev. A. H. Bates, Springfield.
Col. Chas. F. Mills, Springfield.
1894—Geo. W. York, Chicago.
(Now Editor Bees and Honey, Alhambra, California.)
A. I. Root, Medina, Ohio.
W. Z. Hutchinson, Flint, Michigan.
E. R. Root, Medina, Ohio.
C. P. Dadant, Hamilton, Illinois.
Dr. C. C. Miller, Marengo, Illinois.
E. D. Townsend, Altmont, Michigan.
1911—Dr. E. F. Phillips, Cornell University, Ithaca, N. Y.
Dr. G. Bohrer.
Miss Lillian M. Stewart.
1919—Jas. A. Stone, Farmingdale, Illinois.
Aaron Coppin, Wenona, Illinois.
1928—Dr. A. C. Baxter, Springfield.
A. L. Kildow, Putnam.

Charter member deceased 1931—
A. N. Draper, Upper Alton.

Charter members living 1932—
C. P. Dadant, Hamilton, Illinois.
Jas. A. Stone, Farmingdale, Illinois.

STATE CHARTER.
STATE OF ILLINOIS—DEPARTMENT OF STATE.

Isaac N. Pearson, Secretary of State.

To all to whom these presents shall come—GREETINGS:

Whereas, A certificate duly signed and acknowledged having been filed in the office of the Secretary of State on the 27th day of February, A. D. 1891, for the organization of the Illinois State Beekeepers' Association, under and in accordance with the provisions of "An Act Concerning Corporations, approved April 18, 1872, and in force July 1, 1872, and all acts amendatory thereof, a copy of which certificate is hereunto attached.

Now, Therefore, I, Isaac N. Pearson, Secretary of State of the State of Illinois, by virtue of the powers and duties vested in me by law, do hereby certify that the said, The Illinois State Beekeepers' Association, is a legally organized corporation under the laws of the State.

In Testimony Whereof, I hereunto set my hand and cause to be affixed the great seal of State.

Done at the city of Springfield, this 27th day of February, in the year of our Lord one thousand eight hundred and ninety-one, and the Independence of the United States the one hundred and fifteenth.

[SEAL] I. N. PEARSON, *Secretary of State.*

STATE OF ILLINOIS, } ss.
County of Sangamon }

To Isaac N. Pearson, Secretary of State:

We, the undersigned, Perry J. England, Jas. A. Stone, and Albert N. Draper, citizens of the United States, propose to form a corporation, under an act of the General Assembly of the State of Illinois, entitled, "An Act Concerning Corporations," approved April 18, 1872, and all acts amendatory thereof; and for the purpose of such organizations, we hereby state as follows to-wit:

1. The name of such corporation is, The Illinois State Beekeepers' Association.

2. The object for which it is formed is to promote the general interests of the pursuit of bee-culture.

3. The management of the aforesaid Association shall be vested in a board of three Directors, who are to be elected annually.

4. The following persons are hereby selected as the Directors, to control and manage said corporation for the first year of its corporate existence, viz: Perry J. England, Jas. A. Stone, and Albert N. Draper.

5. The location is in Springfield, in the county of Sangamon, State of Illinois.

(Signed) PERRY J. ENGLAND,
JAS. A. STONE,
ALBERT N. DRAPER.

STATE OF ILLINOIS } ss.
Sangamon County }

I, S. Mendenhall, a notary public in and for the county and State aforesaid, do hereby certify that on this 26th day of February, A. D. 1891, personally appeared before me, Perry J. England, James A. Stone, and Albert N. Draper to me personally known to be the same persons who executed the foregoing certificate, and severally acknowledged that they had executed the same for the purpose therein set forth.

In witness whereof, I have hereunto set my hand and seal the day and year above written.

[SEAL] S. MENDENHALL, *Notary Public.*

CONSTITUTION AND BY-LAWS OF THE ILLINOIS STATE BEEKEEPERS' ASSOCIATION.

CONSTITUTION.

ADOPTED FEBRUARY 26, 1891.

ARTICLE I.

This organization shall be known as The Illinois State Beekeepers' Association, and its principal place of business shall be at Springfield, Illinois.

ARTICLE II—OBJECT.

Its object shall be to promote the general interests of the pursuit of bee-culture.

ARTICLE III—MEMBERSHIP.

SECTION 1. Any person interested in apiculture may become a member upon the payment to the Secretary of an annual fee of one dollar and fifty cents ($1.50). (Amended to $1.75, 1919; amended to $1.00 at annual meeting December, 1928). And any affiliating association, as a body may become members on payment of an aggregate fee of fifty cents (50c) per member, as amended November, 1910. (Associations must have affiliated 10 or more members in one of two previous years.)

SEC. 2. Any person may become honorary member by receiving a majority vote at any regular meeting.

ARTICLE IV—OFFICERS.

SECTION 1. The officers of this association shall be, President, Vice-President, Secretary and Treasurer. (Since amended to include 5 regional Vice-Presidents.) Their terms of office shall be for one year, or until their successors are elected and qualified.

SEC. 2. The President, Secretary and Treasurer shall constitute the Executive Committee.

SEC. 3. Vacancies in office—by death, resignation and otherwise—shall be filled by the Executive Committee until the next annual meeting.

ARTICLE V—AMENDMENTS.

This Constitution shall be amended at any annual meeting by a two-thirds vote of all the members present—thirty days' notice having been given to each member of the association.

BY-LAWS.

ARTICLE I.

The officers of the association shall be elected by ballot and by a majority vote.

ARTICLE II.

It shall be the duty of the President to call and preserve order at all meetings of this association; to call for all reports of officers and committees; to put to vote all motions regularly seconded; to count the vote at all elections, and declare the results; to decide upon all questions of order, and to deliver an address at each annual meeting.

ARTICLE III.

The Vice Presidents shall be numbered, respectively, First, Second, Third, Fourth, and Fifth, and it shall be the duty of one of them, in his respective order, to preside in the absence of the President.

ARTICLE IV.

SECTION 1. It shall be the duty of the Secretary to report all proceedings of the association, and to record the same, when approved, in the Secretary's book; to conduct all correspondence of the association, and to file and preserve all papers belonging to the same; to receive the annual dues and pay them over to the Treasurer, taking his receipt for the same; to take and record the name and address of every member of the association; to cause the Constitution and By-Laws to be printed in appropriate form and in such quantities as may be directed by the Executive Committee from time to time, and see that each member is provided with a copy thereof; to make out and publish annually, as far as practicable, statistical tables showing the number of colonies owned in the spring and fall, and the amount of honey and wax produced by each member, together with such other information as may be deemed important, or be directed by the Executive Committee; and to give notice of all meetings of the association in the leading papers of the State, and in the bee journals at least four weeks prior to the time of such meeting.

SEC. 2. The Secretary shall be allowed a reasonable compensation for his services, and to appoint an assistant Secretary if deemed necessary.

ARTICLE V.

It shall be the duty of the Treasurer to take charge of all funds of the association, and to pay them out upon the order of the Executive Committee, taking a receipt for the same; and to render a report of all receipts and expenditures at each annual meeting.

ARTICLE VI.

It shall be the duty of the Executive Committee to select subjects for discussion and appoint members to deliver addresses or read essays, and to transact all interim business.

ARTICLE VII.

The meeting of the association shall be, as far as practicable, governed by the following order of business:

Call to order.
Reading minutes of last meeting.
President's address.
Secretary's report.
Treasurer's report.
Reports of committees.
Unfinished business.
Reception of members and collection.
Miscellaneous business.
Election and installation of officers.
Discussion.
Adjournment.

ARTICLE VIII.

These By-Laws may be amended by a two-thirds vote of all the members present at any annual meeting.

C. E. YOCUM,
AARON COPPIN,
GEO. F. ROBBINS.

BEEKEEPERS' ASSOCIATION.

THE ORIGINAL BILL.

§ 1. Appropriates $1,000 per annum—proviso. § 2. How drawn. § 3. Annual report.

AN ACT *making an appropriation for the Illinois State Beekeepers' Association.*

WHEREAS, The members of the Illinois State Beekeepers' Association have for years given much time and labor without compensation in the endeavor to promote the interests of the beekeepers of the State; and,

WHEREAS, The importance of the industry to the farmers and fruitgrowers of the State warrants the expenditure of a reasonable sum for the holding of annual meetings, the publication of reports and papers containing practical information concerning beekeeping, therefore, to sustain the same and enable this organization to defray the expenses of annual meetings, publishing reports, suppressing foulbrood among bees in the State, and promote the industry in Illinois;

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That there be and is hereby appropriated for the use of the Illinois State Beekeepers' Association the sum of one thousand dollars ($1,000) per annum for the year 1917-1918, for the purpose of advancing the growth and developing the interests of the beekeepers of Illinois, said sum to be expended under the direction of the Illinois State Beekeepers' Association for the purpose of paying the expenses of holding annual meetings, publishing the proceedings of said meetings, suppressing foulbrood among bees in Illinois, etc.

Provided, however, That no officer or officers of the Illinois State Beekeepers' Association shall be entitled to receive any moneys compensation whatever for any services rendered for the same, out of this fund.

SEC. 2. That on the order of the President, countersigned by the Secretary of the Illinois State Beekeepers' Association, and approved by the Governor, the Auditor of Public Accounts shall draw his warrant on the Treasurer of the State of Illinois in favor of the treasury of the Illinois State Beekeepers' Association for the sum herein appropriated.

SEC. 3. It shall be the duty of the Treasurer of the Illinois State Beekeepers' Association to pay out of said appropriation, on itemized and receipted vouchers, such sums as may be authorized by vote of said organization on the order of the President countersigned by the Secretary, and make annual report to the Governor of all such expenditures, as provided by law.

Itemized in the Omnibus Bill as follows:

For shorthand reporting	$200.00
For postage and stationery	50.00
For printing	550.00
Expense of meetings	200.00
Total amount of the appropriation	$1,000.00

The Assembly ruled that this is not to be paid in LUMP, but drawn on itemized accounts.

CODE OF RULES AND STANDARDS FOR GRADING APIARIAN EXHIBITS AT FAIRS AS ADOPTED BY ILLINOIS STATE BEEKEEPERS' ASSOCIATION.

Comb Honey.

Rule 1. Comb honey shall be marked on a scale of 100, as follows:

Quantity	40	Style of display	20
Quality	40		

Rule 2. Points of quality should be:

Variety	5	Straightness of comb	5
Clearness of capping	10	Uniformity	5
Completeness of capping	5	Style of section	5
Completeness of filling	5		

Remarks: 1. By variety is meant different kinds, with regard to the sources from which the honey is gathered, which adds much interest to an exhibit.

2. By clearness of capping is meant freedom from travel stain and a water soaked appearance. This point is marked a little high, because it is a most important one. There is no better test of the quality of comb honey than the appearance of the cappings. If honey is taken off at the proper time, and cared for as it should be, so as to preserve its original clear color, body and flavor will take care of themselves, for excellence in the last two points always accompanies excellence in the first. Clover and basswood honey should be white; heartsease, a dull white tinged with yellow; and Spanish needle, a bright yellow.

3. By uniformity is meant closeness of resemblance in the sections composing the exhibit.

4. By style is meant neatness of the sections, freedom from propolis, etc.

5. Honey so arranged as to show every section should score the highest in style of display, and everything that may add to the tastiness and attractiveness of an exhibit should be considered.

Extracted Honey.

Rule 1. Extracted honey should be marked on a scale of 100, as follows:

Quantity	40	Style and display	15
Quality	45		

Rule 2. Points of quality should be:

Variety	10	Style of package	10
Clearness of color	5	Variety of package	5
Body	5	Finish	5
Flavor	5		

Remarks: 1. Light clover honey pouring out of a vessel is a very light straw color; Spanish needle, a golden hue, and dark clover honey, a dull amber.

2. Style of package is rated a little high, not only because in that consists the principal beauty of an exhibit of extracted honey, but also because it involves the best package for marketing. We want to show honey in the best shape for the retail trade, and that, in this case, means the most attractive style for exhibition. Glass packages should be given the preference

over tin; flint glass over green, and smaller vessels over larger, provided the latter run over one or two pounds.

3. By variety of package is meant chiefly different sizes; but small pails for retailing, and, in addition, cans or kegs (not too large) for whole-saleing may be considered. In the former case, pails painted in assorted colors, and lettered "Pure Honey," should be given the preference.

4. By finish is meant capping, labeling, etc.

5. Less depends upon the manner of arranging an exhibit of extracted than of comb honey, and for that reason, as well as to give a higher number of points to style of package, a smaller scale is allowed for style of display.

Samples of Comb and Extracted Honey.

Rule 1. Single cases of comb honey, entered as such for separate premiums, should be judged by substantially the same rules as those given for a display of comb honey, and samples of extracted, by those governing displays of extracted honey.

Rule 2. Samples of comb or extracted honey, as above, may be considered as part of the general display in their respective departments.

Granulated Honey.

Rule 1. Candied or granulated honey should be judged by the rules for extracted honey, except as below.

Rule 2. Points of quality should be:

Variety	10	Style of package	10
Fineness of grain	5	Variety of package	5
Color	5	Finish	5
Flavor	5		

Rule 3. An exhibit of granulated honey may be entered or considered as part of a display of extracted honey.

Nuclei of Bees.

Rule. Bees in observation hives should be marked on a scale of 100, as follows:

Color and markings	30	Quietness	5
Size of bees	30	Style of comb	5
Brood	10	Style of hive	10
Queen	10		

Remarks: 1. Bees should be exhibited only in the form of single frame nuclei, in hives or cages with glass sides.

2. Italian bees should show three or more bands, ranging from leather color to golden or light yellow.

3. The markings of other races should be those claimed for those races in their purity.

4. A nucleus from which the queen is omitted should score zero on that point.

5. The largest quantity of brood in all stages or nearest to that should score the highest in that respect.

6. The straightest, smoothest and most complete comb with the most honey consistent with the most brood, should score the highest in that respect.

7. That hive which is neatest and best made and shows the bees, etc., to the best advantage should score the highest.

Queen Bees.

Rule. Queen bees in cages should be marked on a scale of 100, as follows:

Quantity	40	Quality and variety	40
Style of caging and display	20		

Remarks: 1. The best in quality consistent with variety should score the highest. A preponderance of Italian queens should overweigh a preponderance of black ones, or, perhaps, of any other race or strain; but sample queens of any or all varieties should be duly considered. Under the head of quality should also be considered the attendant bees. There should be about a dozen with each queen.

2. Neatness and finish of cages should receive due consideration, but the principal points in style are to make and arrange the cages so as to throw the inmates to the best advantage.

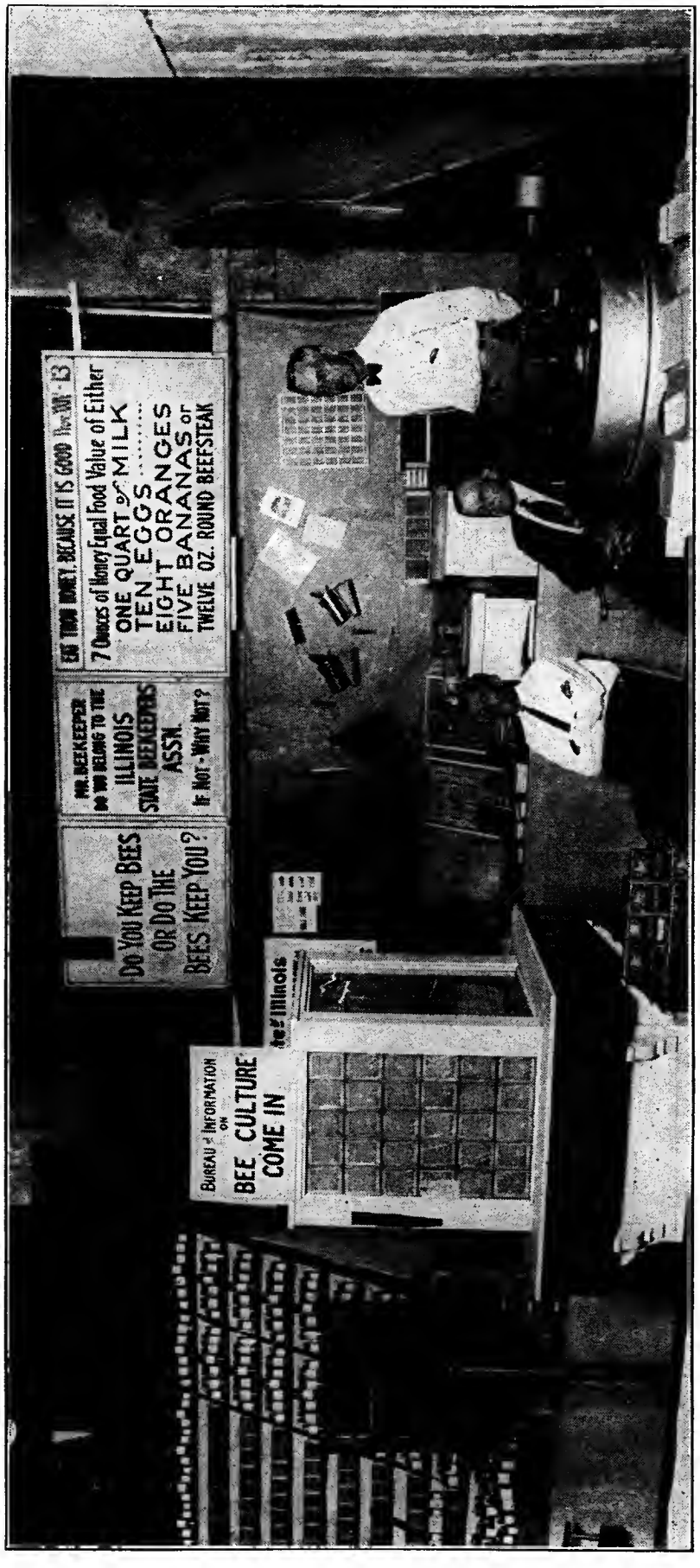
Beeswax.

Rule. Beeswax should be marked on a scale of 100, as follows:

Quantity	40	Quality	40
Style of display	20		

Remarks: 1. Pale, clear, yellow specimens should score the highest, and the darker grades should come next in order.

2. By style is meant chiefly the forms in which the wax is molded and put up for exhibition. Thin cakes or small pieces are more desirable in the retail trade than larger ones. Some attention may be given to novelty and variety.



Information booth of Apiary Inspection Division, Illinois Department of Agriculture, Bee and Honey Exhibit, 1931 Illinois State Fair.

BEES AND HONEY PREMIUM WINNERS—1930 ILLINOIS STATE FAIR.

Class J. Bee Culture—Amount Offered, $625.00.

John MacQueen, Kirkland, Ill.....Member in Charge
C. A. Mackelden, Jerseyville.....Superintendent
Charles A. Kruse, Paris, Ill.....Judge

Case of white comb honey, 24 sections. Jas. A. Stone & Sons, Farmingdale, Ill., 1st. Edwin Kommer, Route No. 4, Cambridge, Ill., 2nd. Walter I. Wright, Putnam, Ill., 3rd.

Case of amber comb honey, 24 sections. Edwin Kommer, 1st. Jas. A. Stone & Sons, 2nd.

Frame of comb honey for extracting. Edwin Kommer, 1st.

Collection of labeled cases containing 12 or more sections of white and amber honey. Edwin Kommer, 1st. Jas. A. Stone & Sons, 2nd.

Display of comb honey. Edwin Kommer, 1st. Jas. A. Stone & Sons, 2nd. Walter I. Wright, 3rd.

Display of light extracted honey, 40 to 60 pounds. Edwin Kommer, 1st. Jas. A. Stone & Sons, 2nd.

Display of amber extracted honey, 40 to 60 pounds. Edwin Kommer, 1st. Jas. A. Stone & Sons, 2nd.

Display of extracted honey. Edwin Kommer, 1st. Jas. A. Stone & Sons, 2nd.

Display of candied honey. Jas. A. Stone & Sons, 1st. Edwin Kommer, 2nd.

Display of design in comb honey executed by the bees under the control of the apiarist. Edwin Kommer, 1st.

One frame Observatory hive, three banded Italian bees with queen. Edwin Kommer, 1st.

One frame Observatory hive, Golden Italian bees with queen. Edwin Kommer, 1st.

Display of beeswax and designs in wax, not less than 50 pounds of wax. Edwin Kommer, 1st. Jas. A. Stone & Sons, 2nd.

Honey vinegar, one-half gallon, with recipe for making. Edwin Kommer, 1st. Jas. A. Stone & Sons, 2nd.

Sweepstakes. Edwin Kommer.

BEES AND HONEY PREMIUM WINNERS—1931 ILLINOIS STATE FAIR.

Class J. Bee Culture—Amount Offered, $625.00.

A. L. Kildow.....Superintendent
Charles A. Kruse, Paris, Ill.....Judge

Case of white comb honey, 24 sections. 1st, Cook County (Jno. J. Wooldridge, 2021 W. 70th Street, Chicago); 2nd, C. F. Earle, Dalton City, Ill.; 3rd, Edwin Kommer, Cambridge, Ill.; 4th, James A. Stone & Son, Farmingdale, Ill.

Case of amber comb honey, 24 sections. 1st, Edwin Kommer.

Frame of comb honey for extracting. 1st, Cook County (Jno. J. Wooldridge); 2nd, Edwin Kommer.

Collection of labeled cases containing 12 or more sections of white and amber honey. 1st, Edwin Kommer; 2nd, Cook County (Jno. J. Wooldridge); and 3rd, James A. Stone and Son.

Display of comb honey. 1st, Edwin Kommer, 2nd, C. F. Earle; 3rd, James A. Stone & Son; 4th, Cook County (Jno. J. Wooldridge); 5th, Walter I. Wright, Route 3, Tiskilwa, Illinois.

Display of light extracted honey, 40 to 60 pounds. 1st, Edwin Kommer; 2nd, Cook County (Jno. J. Wooldridge); 3rd, James A. Stone & Son; 4th, C. F. Earle.

Display of amber extracted honey, 40 to 60 pounds. 1st, Edwin Kommer; 2nd, Cook County (Jno. J. Wooldridge); 3rd, James A. Stone & Son; 4th, C. F. Earle.

Display of extracted honey. 1st, Edwin Kommer; 2nd, Jno. J. Wooldridge; 3rd, James A. Stone & Son; 4th, C. F. Earle.

Display of candied honey. 1st, James A. Stone & Son; 2nd, Edwin Kommer; 3rd, Jno. J. Wooldridge.

Display of designs in comb honey executed by the bees under the control of the apiarist. 1st, Jno. J. Wooldridge; 2nd, Edwin Kommer.

One frame Observatory hive, three banded Italian bees with queen. 1st, Edwin Kommer; 2nd, C. F. Earle; 3rd, Jno. J. Wooldridge.

One frame Observatory hive, Golden Italian bees with queen. 1st, C. F. Earle; 2nd, Edwin Kommer; 3rd, Jno. J. Wooldridge.

Display of beeswax, not less than 50 pounds of wax. 1st, Edwin Kommer; 2nd, Jno. J. Wooldridge; 3rd, James A. Stone & Son.

Designs in beeswax. 1st, Jno. J. Wooldridge; 2nd, Edwin Kommer; 3rd, James A. Stone & Son.

Honey vinegar, one-half gallon, with recipe for making. 1st, James A. Stone & Son; 2nd, Jno. J. Wooldridge; 3rd, Edwin Kommer.

Sweepstakes. 1st, Edwin Kommer; 2nd, James A. Stone & Son.

CHANGES RECOMMENDED IN RULES AND PREMIUMS IN BEE CULTURE EXHIBIT AT ILLINOIS STATE FAIR.

Rules to be amended so that only Illinois honey shall be eligible to receive premium awards.

Exhibits of beeswax in designs to be 5 pound minimum.

Beeswax exhibited for commercial purposes to be in lots of not less than 20 pounds in three pieces or less.

Each exhibitor should have at least one-third more floor space in order to display properly the amount of product required by the rules in the State Fair premium list.

It is recommended that a class be established and premiums awarded in same in which no exhibitor is eligible to show if he has placed in the money in any State Fair within the last 5 years.

The following premium list, providing for $1,000.00 in awards, is recommended. The awards to County Bee Associations shall be based on the number of points won by their respective members in the sweepstakes event.

Premiums.		1st	2d	3d	4th	5th
$ 20.00	Case of white comb honey, 24 sections	$ 7	$ 5	$ 4	$ 3	$ 1
20.00	Case of amber comb honey, 24 sections	7	5	4	3	1
15.00	Frame of comb honey for extracting	6	4	3	2	...
40.00	Collection of labeled cases containing 12 or more sections of white and amber honey	14	10	8	6	2
140.00	Display of comb honey, not less than 250 pounds	50	40	25	15	10
30.00	Display of light extracted honey, 40 to 60 pounds	10	8	6	4	2
30.00	Display of amber extracted honey, 40 to 60 pounds	10	8	6	4	2
140.00	Display of extracted honey, not less than 250 pounds	50	40	25	15	10
130.00	Display of candied honey, not less than 150 pounds	45	35	25	15	10
45.00	Display of designs in comb honey executed by bees under the control of the apiarist	18	12	9	6	...
30.00	One frame Observatory Hive, three banded Italian bees with queen	10	8	6	4	2
30.00	One frame Observatory Hive, golden Italian bees with queen	10	8	6	4	2
25.00	One frame Observatory Hive, Caucausian bees with queen	10	8	5	2	...
25.00	One frame Observatory Hive, Carnolian bees with queen	10	8	5	2	...
50.00	Display of beeswax, not less than 20 pounds in three pieces or less	15	12	10	8	5
45.00	Designs in beeswax, not less than 5 pounds	18	12	9	6	...
10.00	Honey vinegar, ½ gallon, with recipe for same	4	3	2	1	...
175.00	County Associations of Beekeepers awarded according to their members' scores in the Individual Sweepstakes Event	75	50	30	20	...
	Individual Sweepstakes	Ribbon		Ribbon		

The above listed changes were suggested by the special committee for the revision of the State Fair Premium List for Class J—Bee Culture. This committee appointed by Mr. C. A. Mackelden, President of the Illinois State Beekeepers' Association, in August was composed of C. F. Earle of Dalton City, E. A. Wooldridge of Chicago, and Edwin Kommer of Andover, Illinois. They received suggestions from others and presented their report at the annual meeting of the Illinois State Beekeepers' Association at Springfield on November 17-18, 1931, their report being approved and adopted by the convention.

Attention is called to the fact that these recommended changes are included in the list of premiums and certain explanatory notes as given in the printed premium list of the Illinois State Fair for this class are placed with the particular premium to which the statement refers.

(As this report is being sent to the printers there is some indication that the amounts of the premiums will have to be reduced before being accepted by the State Fair Board. Beekeepers who are planning to exhibit in the Apiary Section should be sure to secure a copy of the State Fair Premium List before making final arrangements.)

HONEY COOKERY PREMIUM WINNERS—1930 ILLINOIS STATE FAIR.

CLASS O.

Culinary and Pantry Stores.

Mrs. W. H. Stuart, Chicago.....Member in Charge
Ethel VanGilder, Springfield.....Superintendent

HONEY COOKERY.*

Amount Offered in this Lot, $25.00.

BREAD, ETC.

Plain honey bread. Mrs. Dale Seymour, Franklin, Illinois, 1st. Mrs. G. Wm. Miller, Springfield, Illinois, 2nd. Mrs. Harry Schumacher, Farmingdale, Illinois, 3rd.

Whole wheat bread. Mrs. Dale Seymour, 1st. Mrs. G. Wm. Miller, 2nd.

Honey ginger bread. Mrs. Dale Seymour, 1st. Tena Memken, Farmingdale, Illinois, 2nd.

Honey muffins. Tena Memken, 1st. Mrs. Dale Seymour, 2nd. Mrs. Esther Milum, Urbana, Illinois, 3rd.

Honey oatmeal gems. Mrs. Esther Milum, 1st. Tena Memken, 2nd. Mrs. Dale Seymour, 3rd.

CAKES AND COOKIES.

Amount Offered in this Lot, $25.00.

Honey fudge cake. Mrs. Esther Milum, 1st. Mrs. Dale Seymour, 2nd.

Honey sponge cake. Mrs. Harry Schumacher, 1st. Mrs. Dale Seymour, 2nd.

Honey date bars. Mrs. W. F. Ernst, Farmingdale, Illinois, 1st. Jennie Ernst, Farmingdale, Illinois, 2nd. Mrs. Dale Seymour, 3rd.

Honey Crisp Wafers. Mrs. Dale Seymour, 1st. Mrs. Emma Fargo, Springfield, Illinois, 2nd. Tena Memken, 3rd.

Honey oatmeal cookies. Mrs. Dale Seymour, 1st. Mrs. W. F. Ernst, 2nd. Jennie Ernst, 3rd.

CANDY.

Amount Offered in this Lot, $20.00.

Honey fudge. Mrs. Esther Milum, 1st. Mrs. F. E. Guthrie, Danville, Indiana, 2nd. Mrs. Dale Seymour, 3rd.

Honey divinity. Mrs. F. E. Guthrie, 1st. Mrs. Dale Seymour, 2nd.

Honey nougat. Mrs. Dale Seymour, 1st. Mrs. F. E. Guthrie, 2nd.

* The 1930 premium list carried the first entries in which honey was specified for use in recipes.

HONEY COOKERY PREMIUM WINNERS—1931 ILLINOIS STATE FAIR.

CLASS O.

Culinary and Pantry Stores.

Mrs. W. H. Stuart, Chicago.....Member in Charge
Ethel VanGilder, Springfield.....Superintendent

LOT 143—HONEY COOKERY.

Amount Offered in this Lot, $25.00.

Honey ginger bread; 14 entries—7 shown: 1st, Lena Memken, Farmingdale, $2.50; 2nd, Mrs. Annie M. Fagan, Springfield, $1.50; 3rd, B. Rohrer, Springfield, $1.00.

Honey muffins; 15 entries—7 shown: 1st, B. Rohrer, $2.50; 2nd, Lena Memken, $1.50; 3rd, Mary E. Rohrer, Springfield, $1.00.

Honey oatmeal gems; 10 entries—4 shown: 1st, Mrs. Annie M. Fagan, Springfield, $2.50; 2nd, Mrs. Dale Seymour, Franklin, $1.50; 3rd, Mrs. Nelson Allyn, Springfield, $1.00.

Plain honey bread; 7 entries—5 shown: 1st, Mrs. Dale Seymour, $2.50; 2nd, Mrs. John Milgrim, Quincy, $1.50; 3rd, Mrs. Emma Fargo, Springfield, $1.00.

Whole wheat bread; 6 entries—6 shown: 1st, Mrs. Dale Seymour, $2.50; 2nd, Mrs. Emma Fargo, $1.50; 3rd, Mrs. Harry Schumacher, Farmingdale, $1.00.

LOT 144—HONEY CAKES AND COOKIES.

Amount Offered in this Lot, $58.00.

Honey crisp wafers; 6 entries—3 shown: 1st, Mrs. Dale Seymour, $3.00; 2nd, Mrs. Nelson Allyn, $2.00; 3rd, Lena Memken, $1.00.

Honey date bar; 15 entries—11 shown: 1st, Opal M. Hayes, Franklin, $3.00; 2nd, Mrs. Nelson Allyn, $2.00; 3rd, Mary E. Rohrer, $1.00.

Honey fudge bars, chocolate icing; 10 entries—8 shown: 1st, Mrs. Dale Seymour, $5.00; 2nd, Opal M. Hayes, $3.00; 3rd, Lena Memken, $2.00.

Honey oatmeal cookies; 15 entries—10 shown: 1st, Mrs. John Milgrim, $3.00; 2nd, Mrs. Nelson Allyn, $2.00; 3rd, Mrs. Dale Seymour, $1.00.

Honey cake, white icing; 8 entries—4 shown: 1st, Mrs. Dale Seymour, $5.00; 2nd, Mrs. Harry Schumacher, $3.00; A. B. Kussmaul, Springfield, $2.00.

Honey white, butter icing; 6 entries—5 shown: 1st, Mrs. Dale Seymour, $5.00; 2nd, Mary E. Rohrer, $3.00; 3rd, Jennie Ernst, Farmingdale, $2.00.

Honey yellow, butter icing; 9 entries—4 shown: 1st, Mrs. Dale Seymour, $5.00; 2nd, A. B. Kussmaul, $3.00; 3rd, Mary E. Rohrer, $2.00.

Lot 145—Honey Candy.

Amount Offered in this Lot, $18.00.

Honey divinity: 1st, Mrs. Dale Seymour, $3.00; 2nd, Mrs. Marie A. Wineteer, Springfield, $2.00; 3rd, B. Rohrer, $1.00.

Honey fudge: 1st, Opal M. Hayes, $3.00; 2nd, Mrs. C. K. Rhoades, Decatur, $2.00; 3rd, Mrs. Dale Seymour, $1.00.

Honey nougat: 1st, Mrs. Marie A. Wineteer, $3.00; 2nd, Mary E. Rohrer, $2.00; 3rd, B. Rohrer, $1.00.

GENERAL INFORMATION FOR BEEKEEPERS.

Bee Journals Published in the United States.

	Regular Subscription.	To Assn. Members.
American Bee Journal, Hamilton, Illinois...	$1.00	50c
Beekeepers' Item, Box 838, San Antonio, Texas	1.00	50c
Bees and Honey, 236 West Valley Boulevard, Alhambra, California	1.00	75c
Gleanings in Bee Culture, Medina, Ohio....	1.00 (2 yrs.)	50c (1 yr.) 90c (2 yrs.)

(The publishers will furnish sample copies upon request.)

Several trade and state associations publish journals or circulars of information for their membership as follows:

The American Honey Producers' League Annual Report—Official organ of The American Honey Producers' League. (With membership at $1.00 per year, otherwise 75c per year.)

Wisconsin Beekeeping.

Monthly bulletin Illinois State Beekeepers' Association. (50c to non-members.)

Beecause. 12c. G. B. Lewis Co., Watertown, Wisconsin.

Free Literature and Circulars on Bees and Honey.

Bureau of Entomology, U. S. Department of Agriculture.

Most state experiment stations have bulletins or mimeographed materials.

A. I. Root Co., Medina, Ohio. The Bee Hive.

Kellogg Co., Battle Creek, Michigan.

Recipe pamphlets: Do you like Honey? Cooking with Honey. Do you use Honey?

All-Bran poster, featuring a jar of honey.

Full page advertisement, featuring honey.

Recipe labels for honey containers.

Recipe cards.

Manufacturers of Bee Supplies.

The names of the leading bee supply manufacturers can be obtained by reading the advertisements in the bee journals. They will furnish catalogues upon request.

Shippers of Bees and Queens.

Consult the bee journals. The person or firm that remains in business over a period of years is usually the most reliable. When in doubt as to the reliability of any particular advertiser, write to the editors for definite information.

Books on Bees and Beekeeping.

	PRICE.
Atkins and Hawkins—How to Succeed with Bees	$ .59
Campbell, C. P.—The Law of the Honey Bee	1.00
Dadant, C. P.—First Lessons in Beekeeping	1.00
The Dadant System of Beekeeping	1.00
New Observations Upon Bees—By Huber	3.00
Dadant, M. G.—Out Apiaries	1.00
Doolittle, G. M.—Scientific Queen Rearing	.50
Hawkins, K.—Beekeeping in the South	1.00
Langstroth & Dadant—The Honey-Bee	2.50
Lovell, J. H.—Honey Plants of North America	2.50
Miller, C. C.—Fifty Years Among the Bees	1.50
1,000 Answers to Beekeeping Questions	1.25
Pellet, F. C.—American Honey Plants	3.00
Productive Beekeeping	3.00
Practical Queen Rearing	1.00
Beginners' Bee Book	1.50
Phillips, E. F.—Beekeeping	4.00
Quinby, M.—Mysteries of Beekeeping Explained	1.00
Rowe, H. G.—Starting Right With Bees	.75
Smith, Jay—Queen Rearing Simplified	1.25
Snodgrass—Anatomy and Physiology of the Honey Bee	3.50
Root—A B C & X Y Z of Beekeeping	2.50

Any of this list of books can be purchased from the bee supply manufacturers or the beekeeping journals. Every beekeeper should read several of these books.

Advantages of Membership in State or County Beekeeping Associations.

1. Education on proper methods of managing bees which means bigger crops of quality honey marketed at quality prices.
2. United action and cooperation in the eradication of bee diseases.
3. Reduced rates on subscription to bee journals and free subscription to the association news.
4. Savings on bee supplies by ordering collectively.
5. Uniform prices for honey through cooperative marketing.
6. Acquaintance and friendship of brother beekeepers, developing a spirit of mutual helpfulness.

Diseases of Bees and Apiary Inspection.

Illinois State Apiary Inspection—Mr. A. L. Kildow, Putnam, Illinois, Chief Inspector. State Law on Bee Diseases—Circular No. 261.

EXTRACT FROM CIRCULAR OF INFORMATION.

Bee Culture Laboratories, Bureau of Entomology
United States Department of Agriculture
Washington, D. C.

BULLETINS FOR FREE DISTRIBUTION.

Farmer's Bulletin 447, Bees.
Farmer's Bulletin 653, Honey and its Uses in the Home.
Farmer's Bulletin 961, Transferring Bees to Modern Hives.
Farmer's Bulletin 975, Control of European Foulbrood.
Farmer's Bulletin 1012, Preparation of Bees for Outdoor Wintering.
Farmer's Bulletin 1014, Wintering Bees in Cellars.
Farmer's Bulletin 1039, Commercial Comb Honey Production.
Farmer's Bulletin 1198, Swarm Control.
Farmer's Bulletin 1215, Beekeeping in the Clover Region.
Farmer's Bulletin 1216, Beekeeping in the Buckwheat Region.
Farmer's Bulletin 1222, Beekeeping in the Tulip-tree Region.
Department Circ. 24, United States Grades, Color Standards, and Packing Requirements for Honey. A chart showing requirements for grades of honey and a circular on labels or stamps for honey grades are included in this circular.
Department Circ. 218, Occurrence of Diseases of Adult Bees.
Department Circ. 222, Insulating Value of Commercial Double-Walled Hives.
Department Circ. 284, The Sterilization of American Foulbrood Combs.
Department Circ. 287, Occurrence of Diseases of Adult Bees, II.

INTEREST TO BEEKEEPERS.

Farmer's Bulletin 1005, Sweet Clover on Corn Belt Farms.
Farmer's Bulletin 1062, Buckwheat.
Farmer's Bulletin 1151, Alsike Clover.
Farmer's Bulletin 1283, How to Grow Alfalfa.
Farmer's Bulletin 1411, Crimson Clover, Seed Production.

BULLETINS FOR SALE BY THE SUPERINTENDENT OF DOCUMENTS.

The following publications are not available in the Department of Agriculture but may be purchased at the prices indicated. Remittances should be made to the Superintendent of Documents, Government Printing Office, Washington, D. C., by postal money order, ex-

press order or New York draft. If currency is sent, it will be at sender's risk. Postage stamps, defaced or worn coins, foreign coins and uncertified checks will not be accepted.

Department Bulletin 431, Sacbrood .....10 cents
Department Bulletin 804, A Study of the Behavior of European Foulbrood of Bees in the Colony ..... 5 cents
Department Bulletin 809, American Foulbrood .....15 cents
Department Bulletin 810, European Foulbrood .....10 cents
Department Bulletin 988, Heat Production of Honeybees in Winter ..... 5 cents
Department Bulletin 1222, Growth and Feeding of Honeybee Larvae .....10 cents
Department Bulletin 1328, Flight Activities of the Honeybee.10 cents
Department Bulletin 1339, Effect of Weather upon the Change in Weight of a Colony of Bees during the Honeyflow.....10 cents
Department Bulletin 1349, Brood-Rearing Cycle of the Honeybee .....10 cents
Department Bulletin 1364, "Effects on Honeybees of Spraying Fruit Trees with Arsenicals"..... 5 cents

Comb honey grading chart may be purchased for 15 cents. This chart is printed in four colors.

Farmer's Bulletin 797, Sweet Clover; Growing the Crop.....(5c)
Farmer's Bulletin 820, Sweet Clover; Utilization .....(5c)
Farmer's Bulletin 836, Sweet Clover; Harvesting and Threshing the Seed Crop .....(5c)

Honey poster, "It's All Good Honey," may be purchased for 15 cents. The poster is printed in four colors and is designed to aid in selling honey.

DISEASES OF BEES: Beekeepers in many parts of the country are suffering losses from the two serious brood diseases. In case any discolored or dead brood is difficult to diagnose with accuracy, send a sample to the Bureau of Entomology for examination. On request the Bureau will mail a box suitable for the sending of a sample and give detailed directions for preparing it for mailing. Many states have apiary inspection for the detection of these diseases and for the instruction of the beekeepers in their control. Information concerning the inspection systems may be obtained from the Bureau of Entomology.

PURCHASE OF BEES: When a beekeeper desires to increase the number of his colonies by purchase, the most commendable plan is to buy up any colonies in the neighborhood which are in the hands of those who through their ignorance of good beekeeping practice are unable to get a crop. The purchase of bees in combless packages is advisable only where the shipper and the purchaser are both expert beekeepers. Do not send money for shipments of bees unless you are sure of the shipper's financial standing and business integrity.

The Department of Agriculture does not sell or distribute queenbees or colonies of bees of any race.

MARKETING: Where it is possible to develop a home market for the honey crop, this is recommended, but the beekeeper should be sure that he is not selling his crop so low as to lose the value of his labor. The Bureau of Agricultural Economics of the Department of Agriculture issues twice a month quotations giving the record of actual sales of honey on the leading markets of the country and these should be consulted before selling at wholesale. It also issues four reports annually on the crop conditions and the number and condition of the bees. These reports are free.

KEEP BEES BETTER.

Cardinal Points:

(1) Bees need in spring—plenty of stores, plenty of room for brood rearing and plenty of protection.

(2) Swarming during a honey-flow is undesirable because it reduces the crop. See Farmers' Bulletin 1198 for methods of control.

(3) During a honey-flow bees should be given plenty of storage room. Neglect of this may lose half the crop.

(4) Bees need protection from cold and wind in all parts of the country in which the winter temperature is often as low as freezing. See Farmer's Bulletin 1012 for methods. In unusually cold and windy districts cellar wintering is advised and Farmer's Bulletin 1014 gives the best methods.

(5) The successful beekeeper is he who studies his bees and is prompt with his manipulations. Beekeeping is not a paying business for the shiftless beekeeper. The specialist beekeeper is the most desirable from the standpoint of the industry because the small holder usually has not sufficient interest in the bees to see that they do their best. There is no reason, however, why a few colonies of bees will not be profitable, provided the owner gives them intelligent care.

(6) It is impossible to keep bees with profit in box hives or "gums." The use of movable frame hives cannot be urged too strongly.

(7) It does not pay to cultivate any plant for bees but it may be possible in some localities to improve the nectar resources by the planting of plants such as sweet clover on waste lands. If at any time the bees are short of stores, feed sugar sirup, but avoid the use of any sugar other than granulated and do not use molasses or glucose. Do not let the bees starve or even get so short of stores that they decrease brood-rearing before the honey-flow.

JAMES I. HAMBLETON,
Apiculturist.

ANNUAL BEEKEEPERS' SHORT COURSE.

Each year in January in conjunction with the regular Farm and Home Week Program of the College of Agriculture, the beekeeping division of the Department of Entomology, University of Illinois, offers a complete program for beekeepers. The course is designed to cover the principles or underlying facts for beginners as well as topics of more general interest for the more advanced beekeepers.

Outside talent is generally secured to assist the University staff in presenting the short course. Those assisting with the 1930 program were Mr. M. D. Farrar of the State Natural History Survey, Mr. G. H. Cale, Associate Editor of the American Bee Journal, and V. G. Milum, Apiculturist of the University of Illinois.

In addition to the beekeeping subjects presented, the program of the College of Agriculture always has prominent speakers who are authorities in various fields of agriculture. Departmental programs are usually offered by the separate divisions of Agriculture with programs on Farm Management, Soils and Crops, Poultry, Dairying, Fruits and Vegetables. Thus visitors may round out their stay at the University by gaining information on a variety of subjects in which they are interested.

Those desiring information regarding future Short Courses should send a request to the College of Agriculture, Urbana, Illinois or the Beekeeping Division, Vivarium Building, Champaign, Illinois, to have their names placed on the mailing list for future Farm and Home Week Programs.

The dates for the 1931 Short Course were January 12 to 16, with the following speakers on the program: Mr. M. D. Farrar, State Natural History Survey; Professor R. H. Kelty, Apiculturist, Michigan State College, East Lansing, Michigan; and V. G. Milum, assisted by Mr. R. L. McMunn and Professor M. J. Dorsey of the Division of Pomology in a joint meeting on bees and their relation to pollination.

The dates for the 1932 Short Course were January 13 to 15, with the following speakers: Professor C. L. Metcalf, Department of Entomology; Mr. M. G. Dadant, Hamilton, Illinois; Mr. Virgil N. Argo, Extension Specialist in Beekeeping, Ohio State University; and V. G. Milum.

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Adams, Ed., Strawn.
Adams, Miss Edith, Earlville.
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Allen, Otis, Harrisburg.
Allen, Tom, Coulterville.
Allgren, C. E., Bishop Hill.
Amacker, C. F., Winfield.
Ambrose, Lemual, White Heath.
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Ammon, Henry, Galena.
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Anderson, C. J., Lily Lake.
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Anderson, R. M., Home Ridge Farm, Jerseyville.
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Ashley, W. C., Yorkville.
Atkinson, Robert R., Port Byron.
Attig, Fred, Ashton.
Augenstein, A. A., R. R. 2, Dakota.
Bacle, Louis, Box 235, Norwood Park.
Bacmeister, Wm., Toulon.
Baer, Geo. W., Cissna Park.
Bailey, Carl M., R. R. 7, Decatur.
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Baker, Ralph, R. R. 2, Eldorado.
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Bangs, E. H., 168 Addison Road, Riverside.
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Barr, H. I. & Son, Rock City.
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Bell, Chas. H., Scales Mound.
Bell, Mrs. Paradine, Box 56, Kingston Mines.

* This membership list contains the names of all those who paid membership dues at least once during the period beginning January 1, 1929 and ending February 1, 1932. Included are the names of 141 whose membership expired in 1930 and 178 whose membership expired in 1931.

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Bergschnieder, Leonard, New Berlin.
Bergstrom, Arthur, Aledo.
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Bishop, Frank, Taylorville (Deceased, 1931).
Bitter, Albert, R. R. 3, Decatur.
Black, H. O., R. R. 2, Lewistown.
Black, John W., 303 S. Elm St., Kewanee (present address unknown).
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Brockman, L. H., Jerseyville.
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Brown, Chas. W., Aledo.
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Brown, Lynch, Scott Co., Monmouth.
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Carlson, P. A., Galva.
Carmichael, W. Philip, Stanford.
Carson, Samuel, Harvard.
Casson, Fred, R. R. 1, Farmington.
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Cleveland, Frank, Prophetstown.
Cochran, Smith, Mundelein.
Cole, Fred, Hillsdale.
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Coll, E. F., Cambridge.
Collman, Nathan, Galena.

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Cook, E. T., Mundelein.
Cook Bros., Pecatonica.
Coombs, Jas. F., Shagbark Lake, Des Plaines.
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Dadant, L. C., Hamilton.
Dadant, M. G., Hamilton.
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Decker, F. W., Jerseyville (Deceased, August 7, 1930.)
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Dowell, Fred, West McHenry.
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Elbert, Chas., Clifton.
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Ghere, Albert, Homer.
Gilbert, Lee, Raymond.
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Gleeson, James J., Dayton.
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Glenn, Joe W., Macon.
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Hoefer, A. G., 1655 S. Walnut Avenue, Freeport.
Hoeners, F. E., Beardstown.
Hofer, F. C., R. R. 2, Taylor Ridge.
Hoffman, Henry W., 1826 North Peoria Street, Peru.
Hoffman, Julius H., 1826 North Peoria Street, Peru.
Hofmann, Frank, 39th and Stanley Avenue, Riverside.
Hogue, Frank, Windsor.
Hollars, Grover, Toulon.
Holm, Chris., Box 381, Genoa.
Holmes, A. L., R. R. 5, Jacksonville.
Holmquist, Edw., 1728 Ninth Street, Moline.
Holmquist, Wm., Moline (Deceased, April 30, 1931).
Hood, Alvin C., Libertyville.
Hoover, Dan, R. R. 1, Monmouth.
Horning, Lee, R. R. 4, Morrison.
Howe, Walter V., Wenona.
Howlett, Jess, Aledo.
Hummert, Henry J., Mascoutah.
Hunt, Curtis, New Bedford.
Hunter, W. N., Burgess.
Hurley, Tim, Richmond.
Hyde Bros., New Canton.
Isringhausen, C. J., Jerseyville (present address unknown).
Jackson, Francis, Dewey.
Jackson, W. H., Toulon.
Jacobs, Ora, Downers Grove.
Jacobson, J., Spring Grove.
Jameson, S. L., R. R. 2, Canton.
Jankowski, C. P., Gurnee.
Jeans, E. W., R. R. 1, Hinsdale.
Jeffrey, Edward, Galena.
Jelinek, Richard, Box 14, Naperville.
Jensen, P. S., Piper City.
Jepsen, Jeppe, R. R. 1, Mundelein.
Jepson, C. J., Ringwood.
Johns, Fred, R. R. 7, Decatur.
Johnson, Alex, 512 Hibbard Street, Joliet.
Johnson Brothers, Toulon.
Johnson, Carl A., 417 South Vine Street, Kewanee.
Johnson, Frank, Toulon.
Johnson, Henry, Prophetstown.
Johnson, John F., R. R. 1, Box 99, East Moline.
Johnson, Pardon, R. R., Taylor Ridge.
Jones, G. H., 38 S. Dearborn Street, Chicago.
Jones, H. W., Cary.
Jones, Jay E., R. R. 3, Harvard.
Jones, Mrs. Jennie, Dalton City.
Jordan, E. B., R. R. 1, Deerfield.
Kaneville Grain & Supply Co., Elburn.
Kannenberg, C. F., 1114 Augusta Street, Oak Park.
Kannmacher, Ferry, R. R. 1, Marshall (present address unknown).
Karloski, A. H., R. R. 8, Decatur.
Karstan, J., Lake Forest.

Kaufman, A. D., Cissna Park.
Kaufman, Henry, Stanford.
Keenan, John W., R. R. 5, Galesburg.
Kehl, Otto, Box 174, Lake Forest.
Keifer, F. O., R. R. 4, Freeport.
Keister, Chester E., R. R. 1, Orangeville.
Kell, Charles, R. R. 1, Taylor Ridge.
Keller, P. C., 2105 West Cedar Road, Homewood.
Kelley, B. J., Gilman (present address unknown).
Kelley, John, Henning.
Kelley, Miss Margaret M., 424 S. Ashland Avenue, LaGrange.
Kelley, Otis, R. R. 5, Marion.
Kellogg, Jas. B., Lombard.
Kemmis, Edward, Prophetstown.
Kennel, Geo. W., Metamora.
Kennett, O. W., Ohlman.
Kerwin, Mrs. Hope E., Gross Point.
Ketterman, A. R., Little York.
Kidd, Jessie L., R. R. 1, Champaign.
Kiefer, Xavier, Belle Rive.
Kiefner, Conrad, R. R. 2, Joliet.
Kildow, A. L., Putnam (Honorary Member).
Kildow, Mrs. A. L., Putnam.
Kildow, Ed., Prophetstown.
King, Chas., Moline.
King, Harry L., R. R. 5, Springfield.
Kirby, F. M., 113 E. White, Champaign.
Kirk, W. A., Windsor.
Kirlin, Elva, Warsaw.
Kirlin, Harry T., R. R. 2, Warsaw.
Klein, Chas., Nokomis.
Klein, Edward M., Gurnee.
Klein, J. W., Freeburg.
Kling, Charles, 5719 N. Hermitage Avenue, Chicago.
Kloepping, Dan, Orangeville.
Knantz, Chas., Galena.
Knight, Joseph, Dow.
Knoeppel, H. C., Bluffs.
Knox, John, Wadsworth (Deceased, October 24, 1931).
Kobold, Edw. S., 1727 Ninth Street, Peru.
Koehler, Edwin H., Itasca.
Kommer, Ed., R. R. 4, Cambridge.
Kommer, Elmer, Woodhull.
Koontz, Frank, Stewardson.
Koritz, J. N., R. R. 3, Buckley.
Kortes, Geo., 20 S. Sherman, Freeport.
Kottrash, F., R. R. 1, Deerfield.
Kraemer, Wm. A. C., 6331 Cornelia Avenue, Chicago.
Kraft, Clayton, Lena.
Kragness, T. A., 6031 Wentworth Avenue, Chicago.
Krebs, Philip, Marissa.
Krebs, Walter, Marissa.
Krier, Anna, DesPlaines.
Krueger, Henry, R. R. 2, Prairie View.
Krumnow, Adolph, R. R. 2, Box 29, Galva.
Krynicki, Mrs. M., 3757 N. Richmond Street, Chicago.
Kuehne, R. C., Lake Forest.
Kuklinski, K. A., 4647 Center Avenue, Lyons.
Kunz, Jacob, 714 Iowa Street, Urbana.
Kutz, Walter, Morton Grove.
Kyle, D. Ralph, R. R. 5, Monmouth.
Lair, Frank, Zeigler.
Lamandin, Victor, R. R. 2, Eldorado.
Lamb, James, 446 W. Locust Street, Canton.
Larson, A. E., Bement.
Larson, M. & Son, Gardner.
Laughlin, Harold, Butler.
Lawderdale, E. R., 702 East Fifth Street, West Frankfort.
Lawrence, W. G., R. R. 1, Fulton.
Lechler, E. Fred, 210 Fifth Avenue, Wilmette.
Lee, Arthur, Pecatonica.
Lee, Bert, Pecatonica.
Lee, Robert, R. R. 1, East Moline.
Lefler, F. M., Hamilton.
LeGrand, Theodore, 5440 Center Avenue, Summit.
Lehman, Ed., R. R. 8, West Nebraska Avenue, Peoria.
Leiberman, M. L., Grafton.
Leibert, Ralph M., Elizabeth.
Lentz, Fred, R. R. 3, Harvard.
Leonhart, August, Geneseo.
Lester, Bert, Crescent City.
Le Stourgeon, E. G., The Beekeepers' Item, San Antonio, Texas.
Lieb, M. G., R. R. 2, Bluffs.
Lilly, Frank, Monticello.
Lind, M. H., Bader.
Lindell, C. A., Box 169, Alpha.
Lindstrom, T., R. R. 1, Mundelein.
Lingner, Fred, R. R. 1, East Moline.
Link, George, Prairie View.
Link, Herbert J., LaPorte, Indiana.
Lippold, Everett, R. R. 1, Crystal Lake.
Little, Harvey E., Box 20, R. R. 2, Eldorado.
Logeman, Floyd D., Stockton.
Long, W. C., R. R. 1, McLean.
Loudinburg, A. C., Bradford.
Luer, Harry, Jerseyville.
Lund, Elias, Moorestown, Michigan.
Lundahl, A. L., Geneseo.
Lunger, J. W., 1619 East Street, Ottawa.

Lyman, Mrs. Walter Campbell, 900 Ogden Road, Downers Grove.
Lynn, George, Fifth and Madison Streets, Lockport.
Lynn, Robert, Fifth and Madison Streets, Lockport.
Mackelden, C. A., Jerseyville.
Mackley, Chas. M., 1020 4th Avenue, Peoria.
Macneil, J. A., 11339 S. Irving Avenue, Chicago.
Macrofic, Wilber C., R. R. 7, Decatur.
Madison, M. C., Clifton.
Madsen, L., Gardner.
Magers, H. C., 120 S. Kenilworth Avenue, Elmhurst.
Magnuson, Eskil, Galva.
Mahle, G. C., P. O. Box 333, Washington.
Makepeace, H., Westfield.
Malsch, Ernest, R. R. 3, Woodstock.
Malz, M., 1563 N. Wells Street, Chicago.
Mann, Louis A., Lincoln.
Mapes, Maxel, Paris.
Marcus, Thomas A., 1392 Lincoln Avenue, DesPlaines (present address unknown).
Margibeth, Edward, 213 20th Street, East Moline.
Marsh, Mrs. W. V., Aledo.
Marshall, Wm., 1015 Pleasant Street, DeKalb.
Marshall, W. M., Mahomet.
Martin, Amos, Aledo.
Martin, C. E., Minier.
Mason, Gerald W., Zion.
Matelic, John, 2102 East Main Street, West Frankfort.
Mates, P. E., 526 Strong Avenue, Joliet.
Mathew, B. R., Gilman.
Matthew, O. R., Virginia.
Maxwell, Rane, care of Postoffice, Decatur.
May, Fred H., Meredosia.
McCaffrey, W. H., 704 E. Stephenson Street, Freeport.
McClure, Frank, Chrisman.
McClure, J. H., Murrayville.
McConnell, Herman, R. R. 2, Robinson.
McCormick, E. J., 6810 S. Winchester Avenue, Chicago.
McDaniels, J. E., Girard.
McDonald, John, Richmond.
McDowell, E. L., Hanover.
McElhose, A. L., 816 Belmont Avenue North, Arlington Heights.
McEwen, Mrs. John F., Mansfield.
McInnes, Ralph, Sidney.
McKenrick, J. W., Silvis.
McKenrick, Roy, Silvis.
McKillop, Dan, Lynn Center.
McMaster, A. T., Oneida.
McMillan, Granville, 348 W. Locust, Canton.
McRoberts, Mathew, Chemung.
Medford, George, Jerseyville.
Meier, Wm., Rock City.
Meineke, E. A., Arlington Heights.
Meinen, F. & Son, Baileyville.
Meister, L. B., Metamora.
Meister, Wm. J., Low Point.
Meredith, R. C., Whittington.
Merifield, Paul, Council Hill.
Metzner, John, Hooppole.
Meyer, F. H., 930 Second Street, Des-Plaines.
Meyer, Hugo, R. R. 7, Centralia.
Meyer, Dr. R. C. J., Hillsdale.
Meyers, Chas., Fox Lake.
Michael, S. P. & Sons, R. R. 1, Box 25, Spring Valley.
Michelangeli, Leone, 2311 E. South Grand, Springfield.
Mick, R. R., R. R. 2, Eldorado.
Middelton, Jasper A., Gardner.
Mid West Apiaries, 2737 S. 58th Court, Cicero.
Milbert, A., 2416 Touhy Avenue, Chicago.
Miller, F. G., 233 S. Vine Street, Kewanee.
Miller, F. H., Wilson.
Miller, F. W., 1112 Oak Avenue, Evanston.
Miller, Frank, R. R. 3, Galena.
Miller, George, Waddams Grove.
Miller, Harry, Baileyville (Present address unknown.)
Miller, H. E., Aledo.
Miller, Lew, Alexis.
Miller, L. W., Piper City.
Miller, M. E., Deland.
Milum, V. G., 707 Indiana, Urbana.
Miner, A. B., Table Grove.
Miner, A. F., Harvard.
Minger, Arthur, Cazenovia.
Mitchell, Charles, R. R. 2, LaSalle.
Mitchell, Mrs. Vina, R. R. 3, West Frankfort.
Mitton, Major L., 2757 S. 58th Court, Cicero.
Mohr, Mike, R. R. 1, Box 75, East Moline.
Mon, Chas., Polo.
Moon, S. B., 505 Machin Avenue, Peoria.
Morgan, F. M., DeLand.
Morgan, Glen, Aledo.
Morgan, Park, care Postoffice, Decatur.
Morisse, Levi, Stockton.
Morlock, J. J., R. R. 1, Zion.
Morrill, Mrs. Rosa, R. R. 2, Batavia.

Morrill, Ross R., R. R. 2, Batavia.
Morris, G. Murray, 645 W. Leafland, Decatur.
Morris, W. E., Norris City.
Moughmer, Francis A., Zion.
Moye, Kelley E., Omaha.
Mozee, Gun, 1017 Dakin Street, Chicago.
Muchow, Walter, R. R. 3, Galena.
Muehleip, Herman, Warren.
Mueller, John H., Bluffs.
Mueller, Max E., 814 Park Avenue, Wilmette (Sold bees.)
Mueller, Robert H., care Mueller Co., Decatur.
Mueller, W. G., Bluffs.
Munroe, J. W., R. R. 1, Plainfield.
Munson, Ramsom J., Onarga.
Myers, Arthur, Baileyville.
Myers, W. L., Geneseo.
Nabregoj, Frank, Box 697, Panama.
Nagel, W. W., Sheldon.
Nance, H. H., Windsor.
Neisman, F. W., R. R. 3, Winslow.
Nellis, Chas. Y., 705 S. Franklin, Robinson.
Nelson, John E., Cambridge.
Nelson, Lawrence, North Henderson.
Ness, L. L., Morris.
Nevius, Ed., R. R. 2, Jerseyville.
Newcomb, C. A., Gibson City.
Newcomb, William, Carmi.
Newcomer, S. M., Polo.
Newman, Chas., R. R. 3, Clearing Station.
Newman, N. A., Toulon.
Newton, Harold, Toulon.
Nieland, Wm., Frankfort.
Nielsen, W., Box 221, Lake Forest.
Noack, Max, Plano.
Noble, C. M., R. R. 2, Richmond.
Noble, Jay, Dow.
Nord, Arnold, Libertyville.
Nordine, J. F., Karlstad, Minnesota.
North, Warren L., Winchester.
Nussell, Chas. R., Villa Grove.
Oberholz, Theodore, Peru.
O'Brien, John, Newark.
O'Grady, G. E., R. R. 1, Ingleside.
Olsen, F., R. R. 1, Grayslake.
Olson, Christ, Hinckley.
Olson, Geo., Neponset.
Olson, Gus, 740 43rd Street, Moline.
Osborn, David, Butler.
Osborn, Howard, Butler.
Osborn, Les, R. R. 2, Richmond.
Osborn, Wesley W., Hillsboro.
Osburn, William, Morris.
Ott, Raymond, Geneseo.
Overright, W. S., Herscher (Present address unknown.)
Paddock, A., Round Lake.
Page, Ray, McHenry.
Page, W. E., Ina.
Palmer, D. F., Yorkville.
Panzer, G., R. R. 1, Gurnee.
Parish, A. R., R. R. 1, Decatur.
Parkman, Hiram, Aledo.
Parry, Ed., Box 4, Astoria.
Parsell, Frank S., R. R. 1, Jerseyville.
Paskauskas, Rev. Geo., 12259 Emerald Avenue, Chicago.
Patterson, E. F., R. R. 2, Jacksonville.
Patzke, Robert, West McHenry.
Peach, Robert J., Mitchell & Olive Streets, Arlington Heights.
Peckman, George, R. R. 3, Aledo.
Pellett, Frank C., Hamilton.
Peoria Seed & Bird Store, 406 S. Adams Street, Peoria.
Pepoon, Florence A., Warren.
Perryman, Carlos, Shelbyville.
Persic, Jos., 3812 Deodar Street, Indiana Harbor, Indiana.
Peters, C. W., R. R. 1, McHenry.
Petersen, Axel, Cambridge.
Peterson, Edwin, 1325 Pine Street, Kewanee.
Peterson, H. G., New Windsor.
Peterson, Henry E., Ashkum.
Peterson, Lawrence, 1325 Pine Street, Kewanee.
Peterson, S. F., 2326 Third Avenue, East Moline.
Phillip, C., Lake Forest.
Phillips, Dr. E. F., Ithaca, New York (Honorary member.)
Piatt, Scott, Monticello.
Ping, Jesse T., 1046 S. Water Street, Decatur.
Piper, C. A., R. R. 3, Woodlawn.
Pitzen, M. J., McHenry.
Polcyn, A. J., 315 Huchins Street, Joliet.
Pollock, J. P., Mahomet (Present address unknown.)
Ports, Otho G., Polo.
Powers, Austin, Sterling.
Price, Everett, Toulon.
Price, Henry, Elizabeth.
Pygott, Geo., R. R. 1, Mattoon (Present address unknown.)
Quinley, A. L., Highland Avenue, Galesburg.
Rabideau, Louis, Clifton.
Rambolt, Louis L., 616 Belden Avenue, Chicago.
Rankin, R. E., Payson.
Raska, J., R. R. 1, Lake Villa.
Rastie, J., R. R. 1, Lake Villa.
Rawson, O. G., 3208 Forest Place, East St. Louis.
Readhead, O. J., Mt. Zion.
Reed, Carl, Bradford.
Reeder, Harry, Lena.

Reents, L. H., 410 S. Montgomery Street, Litchfield.
Rees, E. J., R. R. 5, Urbana.
Reese, Henry C., Mount Prospect.
Reeve, T. A., 410 Harden Avenue, Jacksonville.
Reints, George, Lindenwood.
Reischonen, J., Fox Lake.
Reisinger, L. F., 1024 S. Water Street, Decatur.
Retzer, Allie, Hamburg.
Reynolds, E. J., Jacksonville.
Rezek, Otto J., Box 100, Fox River Grove.
Rice, Archie, Farmington.
Rice, Mike, 170 Cleveland Avenue, Batavia.
Richards, J. C., Scales Mound.
Richards, J. D., Scales Mound.
Riehl, Miss Amelia, Godfrey.
Rieser, Emil, care St. Mary's Seminary, Mundelein.
Rife, C. F., R. R. 1, Naperville.
Rinker, W. F., Stewardson.
Ripley, Dow, R. R. 2, Aledo.
Ritter, W. L., Genoa.
Rittler, E. W., 2307 Elm Street, Quincy.
Roark, J. N., Brighton.
Robbins, D. A., Decatur.
Robinson, Chas., care Erzinger Bakery, Silvis.
Rocke, Lawrence, Roanoke.
Rocke, Virgil E., Eureka.
Rockwell, A. J., Astoria.
Rodermaker, C. E., Morrison.
Rodgers, H. D., Box 773, Lewistown.
Roller, Louis, R. R. 1, Lincoln.
Ronneburg, Arthur E., Rock City.
Root, H. H., General Manager, A. I. Root Co., Medina, Ohio.
Rosing, Nick, R. R. 1, Ingleside.
Root, E. R., Medina, Ohio (Honorary member.)
Roselieb, Roy, Prophetstown.
Ross, Ezra, Morris.
Rowe, Robert, R. R. 5, Decatur.
Ruble, Walter, R. R. 8, Decatur.
Rue Seed Co., Mary F. Johnson, Manager, 418 S. Adams Street, Peoria.
Rumery, Fay, 218 Bucklin Street, LaSalle.
Rumery, M. O., 408 West Main Street, Ottawa.
Rybikowski, A., Box 272, North Chicago.
Rylander, Chas., Neponset.
Sack, F., R. R. 1, Deerfield.
Saint Mary of the Lake, Mundelein.
Salmon, H. B. & Co., 612 N. Michigan Avenue, Chicago.
Salt, George, 804 Summit Street, Downers Grove.
Sanders, M. E., Milford.
Sauber & Shaw, R. R. 6, Rockford.
Saucilus, F., 304 E. Sixth Street, West Frankfort.
Sauer, Geo. L., Polo.
Sauer, John P., 222 W. Grand, North, Springfield.
Sauermann, Otto, 2032 W. 103 Street, Chicago.
Schafer, John J., R. R. 2, Port Byron.
Scharfenberg, Wm., Morrison.
Schaub, Vincent, Oak Hill.
Scheff, F., Round Lake.
Scheid, J. P., Eureka.
Scheski, H., Route 1, Deerfield.
Schlosser, J. B., Wadsworth.
Schmertman, Louis, 1326 S. Oak Avenue, Freeport.
Schmidt, Mathias, 105 Summit Street, Joliet.
Schmoll, C. F., Osco.
Schneider, Herman, Dwyer Avenue, Arlington Heights.
Schneider, Walter F., 123 N. York Street, Elmhurst.
Schoonover, R. E., Blair, Wisconsin.
Schryber, M. F., Gurnee.
Schuett, Chas. J., 1027 Sherman Avenue, Evanston.
Schuler, Miss Anna, Mendota.
Schultz, H. W., Box 147, Waterman.
Schwark, John, R. R. 5, Sterling.
Schwartz, Dr. J. G., Jerseyville.
Schwingel, J., Wheeling.
Schwinn, George, Orangeville.
Scott, O. M., Mt. Zion.
Scott, W., 1401 Austin Boulevard, Cicero.
Sears, Sanford, Windsor.
Sedey, F., Waukegan.
Serring, Mrs. Frank, 3541 Natchez Avenue, Chicago.
Schafer, J. J., Rock Grove.
Shaw, James, 704 E. Garland Street, West Frankfort.
Sheer, John, Waddams Grove.
Shepherd, T. J., Opdyke.
Shipp, R. W., 224 S. Seventh Street, DeKalb.
Shoff, Myron B., R. R. 1, Peoria.
Shoop, Chas. H., 432 S. Fourth Street, Aurora.
Short, H. C., Mgr., W. D. Achord Apiaries, Fitzpatrick, Alabama.
Shortell, John, R. R. 1, Utica.
Simmer, Mrs. Eleanor N., 9607 Beverley Avenue, Chicago.
Simmon, Albert, Milan.
Simmons, D., Shelbyville (present address unknown).
Simon, Leo C., R. R. 1, Batchtown.
Simpson, Jesse, Cordova.
Sincock, W. E., Scales Mound.

Sittler, Ida, Hooppole.
Skaggs, Dr. A. A., Lovington.
Skarda, T. J., Ingleside.
Slankard, J. O., R. R. 4, Harrisburg.
Slater, A., Great Lakes.
Sleeth, W. W., R. R. 6, Peoria.
Sloman, Geo. S., R. R. 3, Pawnee.
Smart, Loyd, 435 E. Division Street, Decatur (present address unknown).
Smith, A. C., 1006 Douglas Avenue, R. R. 4, Aurora.
Smith, Chas., Shabbonna.
Smith, Charles G., R. R. 1, Box 17, Hoopeston.
Smith, E. F., 925 W. Cleveland Street, Freeport.
Smith, Fred, 111 N. Highland Avenue, Aurora.
Smith, Geo., 420 Hillside Avenue, Hillsboro.
Smith, J. G., Douglass Avenue, Flossmoor.
Smith, John F., Eureka.
Smith, L. H., R. R. 1, Eldorado.
Smith, M. E., Mahomet.
Smith, Paul, Lovington.
Smith, Paul S., Mt. Zion.
Smith, Wallace, Cameron (moved to Grand Rapids, Minnesota).
Smith, W. B., R. R. 1, Eldorado.
Smith, Willard W., R. R. 1, DeLand.
Snell, David H., Washington.
Snider, Wm. M., R. R. 4, Box 48, Earlville.
Snow, W. E., Geneseo.
Snyder, John W., R. R. 3, Freeport.
Snyder, Wilbur W., R. R. 3, Freeport.
Spangler, John J., 5209 Fairmount Avenue, Downers Grove.
Sperlin, Daniel, Longview.
Sperry, P. R., Alexis.
Sporer, A., 1308 Madison Street, Ottawa.
Stambaugh, R. C., Astoria.
Standish, E. C., R. R. 3, Marengo.
Standish, S. B., R. R. 3, Marengo.
Stanley, E. H., Dixon.
Stanley, Ulysses G., Mountain View Apiary, Nisbet, Pennsylvania.
Stanley, W. H., Dixon.
Staubus, C. C., R. R. 5, Bloomington.
Steiner, James, Geneseo.
Stephens, Dr. O. Z., Stewardson.
Stephenson, D. A., Woodlawn.
Stevenson, A. M., 3021 Jarvis Avenue, Chicago.
Stewart, A. L., R. R. 3, Marengo.
Stewart, Henry, Prophetstown.
Stewart, Leslie J., 515 Ninth Street, LaSalle.
Stinson, O. N., R. R. 2, Eldorado.
Stockdale, Leroy, R. R. 1, Palos Park.
Stocker, Frank G., 1174 Maple Avenue, Oak Park.
Stone, Jas. A., Farmingdale (also Honorary Member).
Stone, O. L., 331 W. Cerro Gordo Street, Decatur.
Stout, Charles E., R. R. 1, Decatur.
Stover Apiaries, Tibbee Station, Mississippi.
Straub, W. F., Laboratories, Ind., 5514-20 Northwest Highway, Chicago.
Strickland, W. F., Whitehall (present address unknown).
Stricklin, Rex, 1207 Trolley Street, Eldorado.
Strieder, C. G., Brimfield.
Stroberg, Fritz, Sycamore.
Strope, J. Floyd, 301 Caroline, Pekin.
Strope, Mrs. J. Floyd, 301 Caroline, Pekin.
Studebaker, A., Seward.
Stumm, W. H., R. R. 3, Edinburg.
Swanland, F. L., Dixon.
Swanson, A. E., Hooppole.
Swanson, C. L., Hamilton.
Swezey, A. H., 19 N. Kensington Avenue, LaGrange.
Swezey, Mrs. J. W., Garden Prairie.
Taylor, Lewis, Bement.
Taylor, O. W., Griggsville.
Teltman, Wm., Strasburg.
Terpening, John, R. R. 6, Galesburg.
Thomas, Alfred E., Secor.
Thomas, Curtis, Cowden.
Thomas, E. A., West McHenry.
Thompson, Hans C., 2614 Seventeenth Avenue, Moline.
Thompson, Mrs. Roy, R. R. 2, Sycamore.
Thompson, Roy, R. R. 2, Sycamore.
Thompson Sisters, Aledo.
Tibbetts, A. R., 760 Oakwood, Lake Forest.
Tieken, F. W., Piper City.
Tiffany, N. C., Grand Tower.
Tipsword, G. C., Lawrenceville.
Tolman, Edgar B., Room 1307, 30 N. LaSalle Street, Chicago.
Trail, Gilbert, 1513 Eldorado Street, Eldorado.
Travis, S. W., 804 Locust Street, Litchfield.
Trent, A. L., 397 Herrick Road, Riverside.
Trowbridge, C. C., Hillsdale.
Tudor, B. R., Lake City.
Tudor, Mrs. C. H., 137 Evans Avenue, DeKalb.
Tudor, C. H., R. R. 2, Sycamore.
Tyler, S. A., San Jose.
Unruh, John, 512 Barrington Avenue, Dundee.

Urda, Tom, Panama.
Urquhart, J. H., R. R. 6, Decatur.
Utt, Archie V., Oak Lawn.
Utterback, H. E., R. R. 2, Ridge Farm.
Valerius, Chas., Elkville.
Vanansdoll, L. R., R. R. 1, Jerseyville.
VanButsele, Louis, 720 N. Center Street, Collinsville.
VanDyke, Ben, Morrison.
Vannis, Louie, Harrisburg.
Vasumpaur, Mrs. Filomene, R. R. 2, Spring Road, Hinsdale.
Veesaert, Elmer R. R. 1, Granite City.
Vesley, Bohmir, R. R. 1, Mundelein.
Voight, William H., Monee.
Voss, Karl & Son, R. R. 6, Freeport.
Voss, Wm. H., Victoria Street, Barrington.
Wachter, Martin, Box 60C, Palos Park.
Wade, J. F., Ridgway.
Wager, Clarence, Genoa.
Wagner, J. N., 638 E. Stephenson Street, Freeport (Deceased, December, 1930.)
Wales, A., 810 Glidden Avenue, DeKalb.
Walk, E. A., R. R. 1, Decatur.
Walker, A. J., R. R. 1, Decatur.
Wall, Wm. J., Windsor.
Wallanchas, Wm., 5715 Dunham Road, Downers Grove.
Walter, John D., R. R. 1, Box 56, Congerville.
Walton, James E., Galena.
Wangler, Henry, Belle Rive.
Wardo, Andrew, 301 Orchard Avenue, Zeigler.
Warner, Emory, Monticello.
Warner, Fred, 416 McCormick Avenue, Hollywood.
Warren, Everett M., 318 N. First Avenue, Maywood.
Warren, Harry R., P. O. Box, 1721, Chicago.
Wasson, J., 621 Third Street, Peoria.
Waterman, F. C., Bartlett.
Watson, Lem, Eldorado.
Watts, Searel, Monticello (Moved to Exeland, Wisconsin, 1930.)
Waymire, O. E., 735 W. Bright Street, Decatur.
Weaver, Walter, Cameron (Present address unknown.)
Webber, A. E., Mineral.
Weed, Geo. H., Lanark.
Weidner, Frank, Milmine.
Weiss, Lawrence M., R. R. 1, Taylor Ridge.
Wellner, Ned, 109 Walsh Street, Joliet.
Werhane, W., 1756 Deerfield Avenue, Highland Park.
Wesley, Jackson, LeRoy.
West, A. N., Aledo.
Westerman, Wm., R. R. 1, Kenosha, Wisconsin (Lake County, Illinois.)
Weston, N. A., W. Springfield Avenue, Champaign.
Wetmore, Laura F., R. R. 2, Mundelein.
Whildin, Everett, Sugar Grove.
Whistel, John, 601 Big 4 Street, Eldorado.
White, Wm. M., Murrayville.
Whitehead, F. B., R. R. 4, Harvard.
Wicena, Dr. A. M., 2838 W. Polk Street, Chicago.
Wicklein, F. A., Percy.
Widicus, Daniel, St. Jacob.
Wiersema, Klaus, Fulton.
Wilde, Clyde, Oregon.
Wiley, C. H., Box 210, Harrisburg.
Wilkins, C. E., 1307 S. Land Street, Harrisburg.
Wilkerson, Ida, R. R. 2, Harvard.
Wilkey, M. C., Maroa.
Williams, A. W., Ava.
Willims, Ben, 3137 Arthur Avenue Brookfield (Present address unknown.)
Williams, R. G., Crypt Chambers, Eastgate Row, South Chester, England.
Williams, R. J., Danvers.
Williams, W. R., Glenwood Avenue, Eldorado.
Wills, E. B., Wheaton.
Wilson, Aubert, R. R. 8, Decatur.
Wilson, Earl, R. R. 5, Galesburg.
Wilson, Frank E., R. R. 1, McHenry.
Wilson, Howard H., Geneseo.
Wilson, Wesley, 404 E. Oregon, Urbana (Sold bees 1931.)
Wilson, W. H., 38 Bee Street, Eldorado.
Winkler, Mrs. Edw., R. R. 1, Joliet.
Wise, L. W., Watseka.
Wolcansek, Joe, Witt.
Wolcott, J. L., Emeling and Major Street, Normal.
Wood, Ray, R. R. 2, Taylor Ridge.
Wooden, Roy, R. R. 2, Mt. Vernon.
Wookey, Alonzo, The Wookey Orchards, R. R. 4, Peoria (Deceased, October 2, 1929).
Wooldridge, Earl, 2021 W. Seventieth Street, Chicago (Deceased, 1929).
Wooldridge, J. R., 2021 W. Seventieth Street, Chicago.
Word, G. L., Gibson City.
Wright, Clyde, Box 88, Wauconda.
Wright, Lester D., Fenton.
Wright, Walter, R. R. 3, Tiskilwa.

Wrigley, S. W., 123 W. Walnut Street, Sycamore.
Wuetig, Christian J., 2609 W. Vermont Street, Blue Island.
Wyne, E. C., Lintner.
Young, C. Frank, 414 S. Hamilton Avenue, Monticello.
Young, J. C., Freeport.
Young, W. C., 8514 S. Elizabeth Street, Chicago.
York, Geo. W., Bees and Honey, 236 West Valley Blvd., Alhambra, California (Honorary Member).
Zadel, Frank, Witt.
Zarasky, Mike, 1625 E. Jefferson Street, Springfield.
Zibble, W. H., 1225 Washington Avenue, Wilmette.
Zook, Tom, 106 Bloomington, East Peoria.

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